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Decontrol

AFTER something like a year's deliberations, the Gorell Committee has finished its task of examining matters of control and regulation, particularly those affecting private flying, and the Report was published towards the end of last week as a White Paper (Cmd. 4654). Elsewhere in this issue of *Flight* will be found a summary of the recommendations contained in the Report, and of the attitude of the Air Council towards these recommendations.

On the whole, the Gorell Committee has come to much the same conclusions as those frequently expressed in *Flight* during 1932 and 1933, and in this connection we may be permitted to recall that on October 20, 1932, in an Editorial Comment entitled "A.N.D.11," attention was called very strongly to the issue of Air Navigation Direction, which, among other things, had the effect of forbidding a man from designing and building an aeroplane and flying it over his own property unless he had first obtained permission in writing from the Secretary of State for Air. A.N.D.11 was not, perhaps, much worse than some of its many predecessors, but it proved to be the straw which broke the camel's back, and *Flight* took the lead in a campaign to get not only A.N.D.11 but a host of other restrictions rescinded. The appointment of the Gorell Committee was a direct result of that campaign, and we are extremely glad to find that, on the whole, the Air Council is, according to the Memorandum which accompanies the Gorell Report, prepared to take notice of the recommendations of the Committee.

Generally speaking, the Gorell Committee comes to the conclusion that the present airworthiness regulations have had a hampering influence, and that more rapid progress would be made if the whole subject of design and construction checking were handed over to an independent body, which, it is suggested, should be given the title "The Air Registration Board." Apart from the fact that the suggested title is somewhat inept, the Board being concerned, not with registering the air but aircraft, it will probably be a good thing to get design approval of civil aircraft out of the hands of departments whose officials, with the best will in the world, must of necessity be so submerged in the atmosphere of military design that their outlook is restricted. The practical difficulties will be considerable, but with good will on all sides they should not be insuperable.

Making the possession of a Certificate of Airworthiness optional, except for machines used on regular air routes, should be a good move, even if the saving in cost of manufacture cannot well be great for some time to come. We cannot, however, quite see eye to eye with the Gorell Committee when it suggests (para. 40, p. 33) that the Registration Board should include with a recommendation for the granting of a Certificate of Airworthiness a statement that "the factors of safety . . . were adequate, and that the aircraft would fulfil the *requirements of minimum performance laid down.*" (The italics are ours.) Why should we stick to these requirements of minimum performance? It does not appear to be any function of the Air Council to decide what should be the minimum of performance. We assume that what is referred to is the take-off regulation which specifies a certain rate and angle of climb. But is it necessary for the Air Council to sit in judgment on what is or is not adequate? Surely, the manufacturer and the purchaser are able to decide that between them. In any case, what is a safe take-off in one set of conditions may well be totally inadequate in another set of conditions.

Another direction in which the Gorell Committee agrees with *Flight* is on the subject of the "personal element." The Report points out that by far the greater number of accidents result from causes which have little or nothing to do with the design and construction of aircraft. In *Flight* of September 7, 1933, we called attention to this fact, and pointed out that the result

was that we were taking endless trouble to legislate for risks which were considerably below one-half of the total. Had this simple truth been generally realised and acted upon after the war, we should never have had the maze of detail technical regulations which now hedge us in on all sides.

An Increase at Last

AT long last the Government has announced its intention of making a definite increase in the strength of the Royal Air Force. Mr. Baldwin, the acting Prime Minister, made no allusion to the uncompleted programme of 1923, which laid down fifty-two squadrons as the minimum then considered desirable for the Home Defence Force. This is a totally new programme, and provides for thirty-one new squadrons for the Home Defence Force over and above the two which were provided for in the last Air Estimates, as well as eight new squadrons which will be divided between the Overseas Commands and the Fleet Air Arm. This figure eight includes one flying boat squadron and one Fleet Air Arm squadron already sanctioned.

The spreading of this programme over five years is reasonable. It should prevent any unpleasant additions to the income-tax. It should obviate expensive panic measures in buying land for aerodromes and in placing building contracts for barracks and hangars. It also should prevent too much standardisation of aircraft types.

There seems no inclination to quibble with Mr. Baldwin on the exact interpretation of the word "parity," which was used in his earlier promise. Many things may be understood by such a word, for parity in total machine strength of the R.A.F. wherever stationed is one thing, and parity in the Home Defence strength is another. Probably what most voters in this country have in mind when they speak of parity with other Powers which are within striking distance is the Home Defence Force. That is natural, for the expression so often used, "within striking distance," obviously implies it. Parity with such Powers is not to be affected by, say, increasing the number of flying boat squadrons in the Middle and Far East Commands, the number of catapult seaplanes on the China station, or even the number of army co-operation squadrons in Great Britain. The important figures in the programme, so far as Home Defence is concerned, are thirty-one new squadrons to be added to the existing forty-four (one of which is *temporarily* at Singapore), which will give us a total of seventy-five squadrons in 1938. Some of these squadrons will have twelve first-line machines and others will have ten.

The increase of six squadrons additional to those already sanctioned, to be divided between the Oversea Commands and the Fleet Air Arm, is extremely welcome, though we cannot regard it as affecting our parity with Powers within striking distance. The Fleet Air Arm has always been just as strong as the Admiralty (subject to Treasury sanction) desired it to be, for the Admiralty pays for all that it orders. It is only a system of book-keeping which shows the cost of the Fleet Air Arm as part of the Air Estimates. It would hardly seem to call for a pronouncement by the acting Prime Minister if more squadrons were to be added to that Arm. Additions to overseas squadrons are another matter, though they, too, are partially paid for by appropriations-in-aid from India and other Governments. We may venture a prophecy that the air garrison of Singapore will be substantially increased, and we should like to see the situation clarified by the formal handing over of No. 100 (Bomber) Squadron to the Far East Command and its replacement by another unit at home. We may also hope that more flying boat squadrons will be raised, for they are of the utmost importance in any scheme of Empire Defence. Apparently, no addition is to be made to the small body of five army co-operation squadrons in this country; and we understand that the War Office has not yet asked for any more. The Army in India may, on the other hand, wish for an increase; and it would not be surprising if the Middle East Command wanted more troop-carriers. We must not be dazzled by the promise of forty-one new squadrons. We must fix our attention on the prospect of having seventy-five squadrons for Home Defence by 1938. That is twenty-three more than the 1923 programme, and it cannot be called an excessive increase.

The Air Exercises

ONCE more the squadrons of the Command, Air Defence of Great Britain, are engaged in exercises to practise them and their commanders in the defence of London. For the past two years London has been kept out of the area of the exercises, and it has been generally understood that one reason for this was to create a suitable "Geneva" atmosphere.

Now there is no longer any need to worry about what Geneva may think. We have piped the pipe of peace (if the mixed metaphor may be excused) to the nations and they have not danced. The time has come to increase the strength of our Air Force, and perhaps it is just as well to give the people of London a reminder of what is the chief task of that Air Force. Pacifists may be shocked at the idea that Great Britain should be such an evil beast as to defend herself when attacked; and others may be so worried by the noise of engines overhead as to think that our Air Force is a great deal too big already. Exponents of air "frightfulness" will say "Ah! You see that cannot prevent the enemy bombers from getting through. You ought first to have exterminated the whole of their population with poison gas. It is the only thing to do." Sensible folk will reflect that, of course, the bomber will always get through when there are no real bullets in the guns of the fighters. Moreover, we like to think that British bombers will always get through when attacked by enemy fighters, and the best way to rehearse that is to try to get through the British defence cordons. Those who are privileged to see a little behind the scenes will be able to judge the physical weariness which afflicts both sides after a few days of sham fighting, even though there is an armistice each day from 09.00 to 18.00 hours. That alone is sufficient reason for an increase in the number of our squadrons.

The greatest mistake which anyone can make is to imagine that one side will win this sham war and that the other side will lose it. It is not a competition, but an exercise. It exercises not only the officers and men of the squadrons, but also the staffs of the various Commands. That the people of London should have their attention drawn to some of these matters is very desirable.

The Outlook

A Running Commentary on Air Topics

The Minority Report

MR. E. C. GORDON ENGLAND and Lt. Col. J. T. C. Moore-Brabazon unequivocally, in Reservation I of the Gorell Report, demand that civil aviation should be entirely divorced from the Air Ministry. They subscribe to the general conclusions, but make it quite clear that what they really want is to put civil aviation under the jurisdiction of another Government Department, free, as they put it, of the war complex. This sweeping change they look upon as a panacea for the growing-pains which now beset civil aviation. Although Lord Londonderry states that this minority report, and the first two recommendations of the main report which deal with the same subject, but in a less definite manner, concern questions which were not remitted to the Committee, he, nevertheless, sees fit to comment upon them at great length. We do not agree that civil aviation would be served best by removal from Air Ministry control. We have, ever since we first drew attention to the whole question, frequently pointed out that all our investigations went to show that what was wanted was simplification of the existing regulations rather than the imposition of new regulations by another controlling body; moreover, there was much evidence to show that constructors received a great deal of help at a very small cost from departments like the R.A.E.

Lord Londonderry obviously tries to substantiate the Government's view by refuting many of the statements in the minority report, but seems to us to have lost weight in his arguments by doing so. He, for example, is surely a bit hard on some of the other members of the Committee, who are actual owners and operators of private aeroplanes, when he quotes the signee of a second reservation which subscribes to the Government view, as having the "most extensive practical experience of the problems involved." He further states that the design of civil aircraft has not been influenced by military requirements, but he does not recall that considerable numbers of those aircraft have proved to be just what certain nations wanted for military purposes. He holds it up as an argument in the Government's favour that other countries have copied our administration, and quotes Italy and France as examples; but it can hardly be said that the civil aircraft of either of these countries are vastly better than our own, bearing in mind the purposes for which they are designed. Lord Londonderry would have done better to have let the matter rest after stating that the first two recommendations and the two minority reservations were somewhat irrelevant, and to have shown, with greater exactness, the extent to which the Government propose to carry out the general findings of the Committee.

I.C.A.N.

THE recommendation that the international airworthiness standards, as laid down by the International Commission for Air Navigation, should only be formulated on broad lines, and should cease to deal with details of performance is admirable. These detail requirements serve no useful purpose at present, and are no guarantee that any particular machine is airworthy. They are a hindrance to the development of commercial aircraft, particularly of multi-engined types which, as the risk of forced landings is negligible, only use certain aerodromes on fixed routes. The questions of take-off and climb are matters for the operator and user, and, within limits, do not affect the structural airworthiness of the machine.

Unapproved Firms

AMONG the suggestions is one of financial assistance to enable unapproved firms to bear the cost of submitting their designs to officially approved "consultants" for check stressing. It would seem more logical for the Board itself to deal with checking and approval, and not to subsidise private individuals in this manner. The regulations in the past have tended to make the aircraft industry a "closed" one; the substitution of approved consultants for the R.A.E. at Farnborough hardly seems likely to improve the position.

Experimental Aircraft

IF the recommendations are accepted, then people will be able to build experimental aircraft, and to fly them without let or hindrance, except that of third-party insurance when flying over open country, and the avoidance of populous areas. This may lead to some "crashery" by young and inexperienced inventors, but it will certainly assist established firms very greatly, and will form an open door through which designs may see the light of day when they would otherwise have been smothered at birth by the "pillow of red tape."

Gliding

NOW that the announcement has already been made that a subsidy of £5,000 per annum for five years is being allocated to the gliding movement, the findings of the Committee on the subject lose some of their interest. In fact, they, in most cases, appear to be at variance with the views of the majority of those concerned; views which were stated in our leader of June 14, 1934. They cast some doubt upon the possible value of gliding as preparatory training for the pilotage of power-driven aircraft, and, therefore, consider State assistance unwarranted. Gliding is undoubtedly of value to those who are subsequently going to pilot power-driven aircraft, and both Poland and Italy make their military pilots go through the State gliding school before joining their Air Forces. The Committee try to anticipate the inevitable by saying that if a subsidy must be given then it ought to take the same form as that to light aeroplane clubs. As we stated in our leader, we do not agree with that view. It will only lead to a mushroom and forced growth in the number of pilots, few of whom will remain of value to the movement as a whole.

R.T.O.'s

THERE appears to be some slight unclearness in the Report on the subject of Resident Technical Officers. In paragraph 41 (i) it is stated that "the supervision of these firms (*i.e.*, approved firms) would, however, be carried out, not by resident officers, but by check inspections from time to time." Yet on the next page one finds the following sentence: "The Air Ministry research and experimental stations should be regarded as available to undertake work for the Board, and the resident technical officials at the works of approved firms should render assistance, if required." The explanation of this seeming contradiction probably is that the Committee had in mind firms which build military aircraft, and which would have R.T.O.'s, but many of the smaller firms build civil types only.

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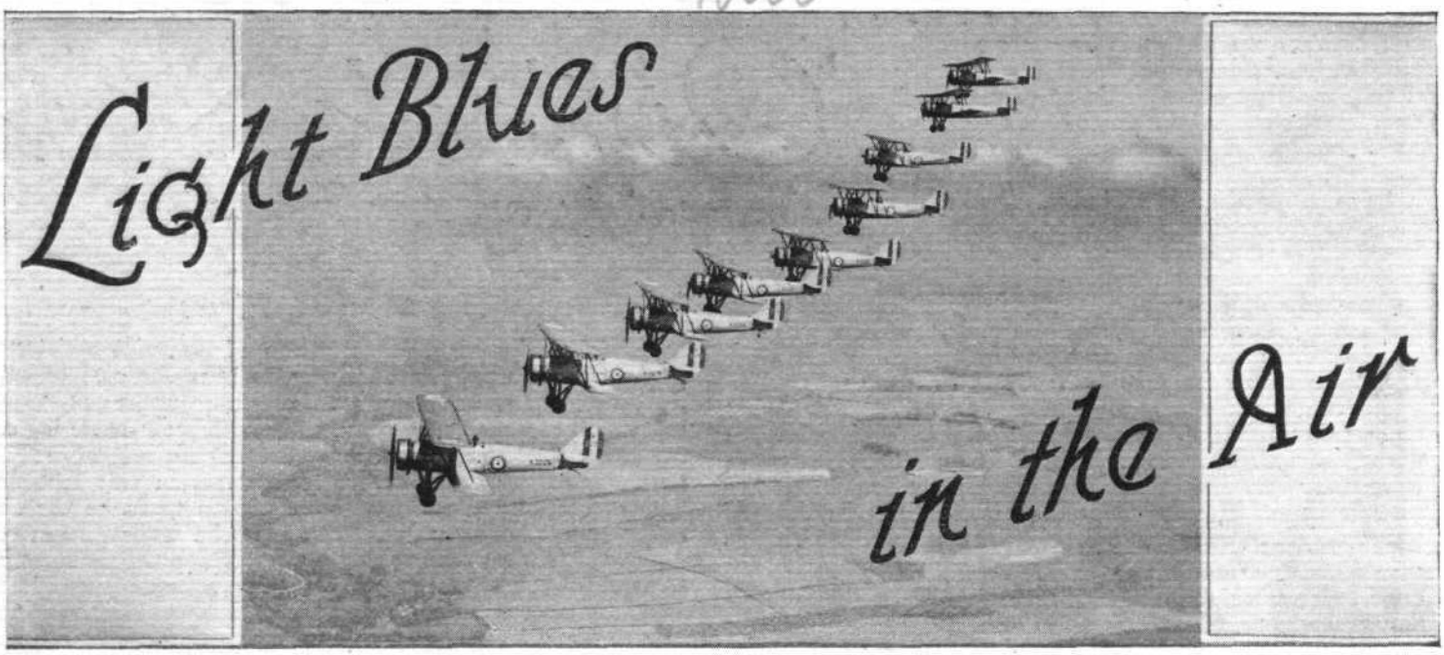

THE CAMBRIDGE SQUADRON AT NETHERAVON

By MAJOR F. A. de V. ROBERTSON, V.D.

ONCE again a very enjoyable visit to the Cambridge University Air Squadron during their annual attachment may be recorded. Wing Commander F. E. P. Barrington, the chief instructor (himself a Cambridge man) and his adjutant, Flt. Lt. T. M. Williams, M.C., D.F.C., are ideal hosts, and nothing more could have been done than they did to welcome the representatives of the Press. It was also a great pleasure to meet an old friend in the chief flying instructor, or, more officially, the C.O. of the Duxford Station Flight, Sqd. Ldr. J. S. Chick, M.C., A.F.C., p.s.a., still remembered in Rugby circles as a dashing and very skilful wing forward. The other officers of the Duxford Station Flight and the undergraduate members of the Cambridge squadron all joined in the work of hospitality, and the kindness of Sqd. Ldr. A. O. Lewis-Roberts, D.F.C., and Flt. Lt. D. H. Carey, both of the new-formed No. 142 (Bomber) Squadron, in helping the photographers is also remembered with gratitude. As the weather was ideal—bright sun with a cooling breeze—the visit was as pleasant as it could possibly be.

The Cambridge squadron is spending its annual attachment at Netheravon on Salisbury Plain, and it is flying nothing less pleasant than the Avro 504 N ("Lynx") and the Avro "Tutor," on both of which facts the squadron may be congratulated—though perhaps it would be an improvement if the aerodrome were somewhat more level. No. 13 (Army Co-operation) Squadron is stationed at Netheravon, but at present it is absent on duty at some Army exercises. The Officers' Mess is old, pre-war in fact, but it is much more attractive and comfortable than most of the older R.A.F. mess buildings, and is certainly less raw than the new standard pattern.

It may be as well to remind our readers that the University Air Squadrons are not military units. The members undertake no military obligations. The squadrons are partly in the nature of an Officers' Training Corps and partly of a flying club. Membership is limited to 75 members of the University. During term time, ground instruction is given at the headquarters at Fen Causeway in Cambridge, and dual instruction in flying is given at Duxford aerodrome, where the Station Flight caters for the Cambridge men. Only qualified pilots may fly solo during term time. First solos may only be made during the annual attachment during the Long Vacation. This is divided into three periods of a fortnight each, and 25 members come into camp for each fortnight.

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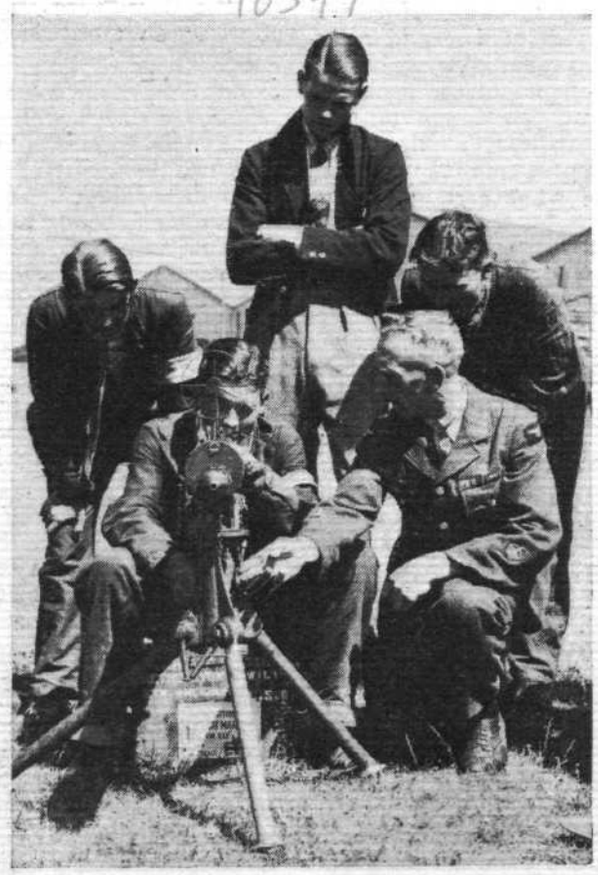

GUNNERY TRAINING: Members of the C.U.A.S. receiving instruction. (*Flight* Photo)

During the last three years twenty-seven members of the squadron have been granted permanent commissions in the Royal Air Force, and some old members of the squadron are now posted to the Duxford Station Flight. A degree is necessary before a University commission is granted, and an ante-date of one year is given to University candidates, and a year and a half to those who have gained first-class or second-class honours. Five members, all Honours men, are applying for permanent commissions this year. It has now been ruled that members of the University squadrons must not hold commissions in the Reserve while still in the squadrons. On appointment to a permanent commission, a University man goes to a Flying Training School for final polishing up as an officer before being posted to a regular squadron. Those who obtain commissions in the Auxiliary

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IN FORMATION: The Cambridge University Air Squadron on Avro "Tutors" over Salisbury Plain. (*Flight* Photo.)

Air Force receive final training with their own squadrons, and those who join the Reserve of Air Force Officers do annual flying training at the selected civilian flying schools. Therefore the training at Cambridge is directed towards turning out sound civil pilots. The principle which obtains at present is to send the men up solo as soon as that can be done with safety, and to continue dual instruction after that ordeal has been passed. During the present attachment forty-seven men have made their first solo flights.

It so happened this year that at the beginning of the attachment there were three members of the squadron who had never been in the air at all. All of them are now flying solo. One of these men, a member of St. John's College, was a remarkable case. He was considered fit to go solo on his third day, after only 3½ hours of dual instruction. He is evidently a natural pilot. As a contrast another case may be mentioned of a man who could not be taught to fly. He was quite an average athlete, and medical examination could find nothing abnormal in his eyesight or other senses. On the Reid apparatus for indicating a pilot's aptitude, this pupil showed up no worse than many others had done. Yet after twenty-seven hours of dual instruction he had made no progress, and had to be turned down as unlikely to make an efficient pilot. This case is as rare as the previous one, but it is interesting to note that there are a few people, otherwise quite normal, who have no flying aptitude at all.

Talking of athletes, it is also interesting to learn that among the present seventy-five members of the squadron four are Rugby Blues, one is a hockey Blue, one a boxing Blue, one has a half-Blue for ice hockey, while there is another Rugby Blue on the waiting list. One

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GENTLE PERSUASION: Starting the "Lynx" engine of one of the C.U.A.S. Avro 504's by means of a Hucks starter. (*Flight* Photo.)

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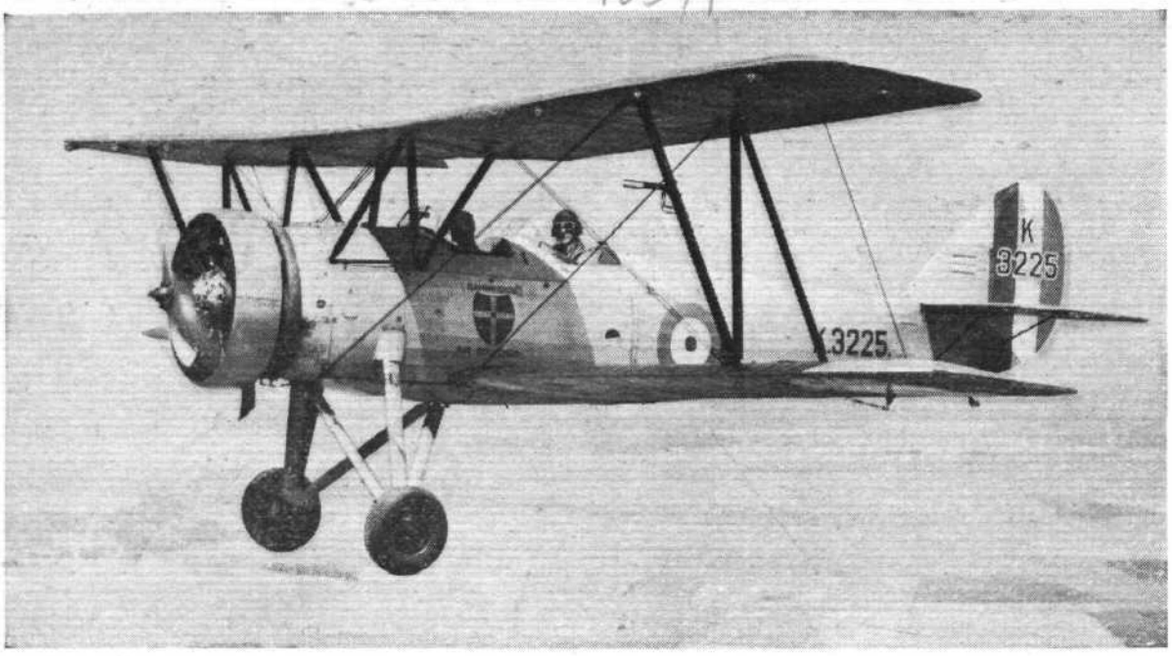

THE CHIEF INSTRUCTOR: Sqd. Ldr. Chick in an Avro "Tutor." (*Flight* Photo.)

member is in his fifth year. After taking first-class honours in Mechanical Science, he won the exhibition given by the City Company of Armourers and Braziers for Aeronautical Research, and so stayed up for a fifth year. He acted as observer in the experiments which Professor Melvill Jones had carried out to enquire into the problems of stalling.

Four of the members are from South Africa, two from New Zealand, and two from Canada. One is a Maltese of a distinguished family of that island. One is a nephew of Air Com. Cave-Browne-Cave, and one is a son of the Iraqi Minister in London, Jaafar Pasha, the only man to gain the Iron Cross and the Distinguished Service Order.

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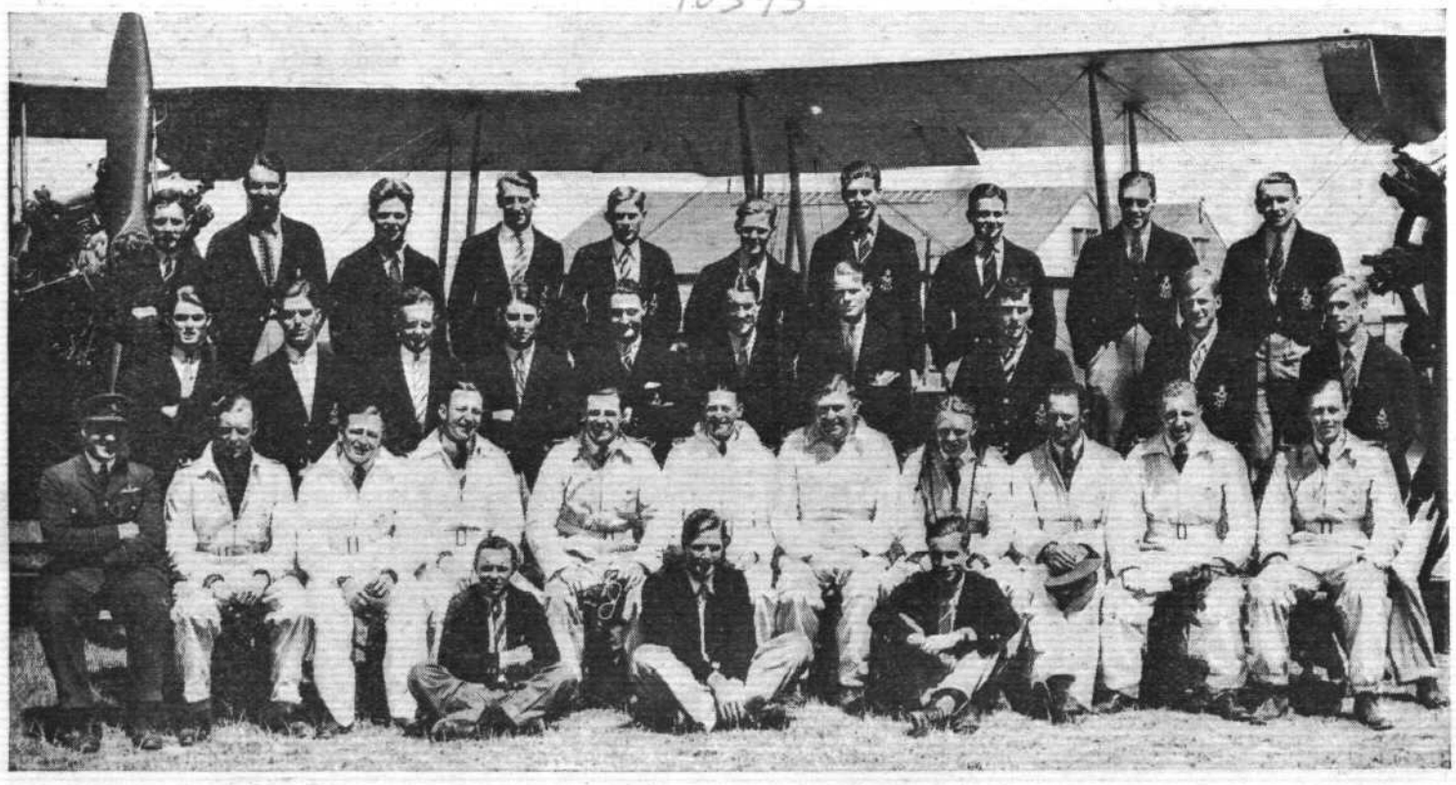


MEMBERS OF THE CAMBRIDGE UNIVERSITY AIR SQUADRON: Four of the present 75 members of the squadron are Rugby Blues, one a Hockey Blue, and one a Boxing Blue. (*Flight* Photo.)

Politicians Visit Bristol Works

Members of the Parliamentary Air Committee visited the works of the Bristol Aeroplane Company on July 23. They flew from Croydon in *Syrinx* (four Bristol "Jupiters"), the second of the Short Bros.' air liners to be taken into service by Imperial Airways. This was the first occasion upon which members of this Committee have visited an aircraft and aero engine factory.

"Gugnunc" for the Nation

The fully slotted and flapped aeroplane built by Handley Page, Ltd., for the Guggenheim Competition in America, and dubbed the "Gugnunc" by *Flight*, was formally presented to the Science Museum, Kensington, on July 19. The original Siddeley "Mongoose" engine used in the machine was, at the same time, presented with the machine by Sir John Siddeley.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —

CROYDON

Passengers of To-morrow : A Real-life Broadcast : The Merchant Service of the Air : Busy Spartan Air Lines : "Low Flying" Stories

THE slow growth of air-mindedness in this country is largely due, one feels, to our neglect of the "passengers of to-morrow"—the boys and girls still at school. The importance of a new generation of air travellers is best instanced by the fact that very many business men of 40 or 50 take their first air journey more or less reluctantly, whereas their boys and girls, aged 14 or 15, think it as natural a form of travel as the train, and infinitely superior.

Other countries, such as Holland and Germany, do not neglect the younger generation, but make every effort to get them, whole schools at a time, to their commercial airports. Croydon, government-owned and run, has welcomed nobody very much except odd spoon-fed sheiks and sultans, and it is pleasant to note that efforts to interest the young people are now being made.

Last week Uncle Mac, of the B.B.C., assisted by Uncle "Bill" Lawford, of the control tower, gave an extremely interesting broadcast during the children's hour. It was done from the control tower, and was therefore natural, without incidental noises unlike other noises known to man. It so happened that OO-AIL was due to depart, and the Sabena pilot spoke to the children both before departure and when in flight. The pilot was M. Van Ackere. Uncle Mac recalled that he and "Bill" Lawford were in the Royal Flying Corps together, and mentioned that "Bill" piloted the first civil machine to Paris in 1919.

The success of the broadcast was clear when numerous letters of congratulation from parents were received. Several local householders had their small people running madly to the top of the house to see the Sabena OO-AIL take off and fly overhead, and then tumbling downstairs again to hear the pilot speak.

Another excellent thing was the opening of a "Merchant Service of the Air" section of the "Worcester" training ship. The ceremony of "breaking" the civil air ensign took place, and Capt. O. P. Jones went down from Croydon to address the cadets. A more impressive "ship's captain of the air" could not be found in any country.

Commercial pilots all agree that something of this kind is quite essential. Unfortunately for those who think military and civil aviation are much the same, actual experience proves that ex-R.A.F. pilots do not make good passenger-carrying air liner commanders until they have had considerable training. I believe that Imperial Airways, Ltd., find some of their best junior pilots among "flying engineers" who have studied the art of commercial flying as such, and then taken their pilot's "ticket." Other companies have formed their own training schools for civil pilots.

It is not only the younger generation which needs tuition in air matters, especially commercial air matters. Under the auspices of the Air League of the British Empire thirty members of the Parliamentary Air Committee were flown to Bristol on Monday, June 23, by *Scylla* to inspect the Bristol aeroplane and engine works.

Despite one of those mysterious slumps in traffic at the beginning of the week, traffic on all lines has been extremely good, and the airport figures for July, I venture to prophesy, will reach 12,000 passengers. An outstanding example of week-end traffic was the line to the Isle of Wight run for Railway Air Services, Ltd., by Spartan Air Lines with "Spartan" cruisers, machines which have certainly proved their worth this summer. Last Friday the 9.20 a.m. departure was full, the 11.40 a.m. and 4.10 p.m. services were both duplicated, and for the evening service also duplicated with "Cruisers," and an "Argosy" of Imperial Airways, Ltd , had to be chartered. Capt. Macintosh, by the way, who has not been seen at Croydon for some time, has now joined Spartan Air Lines, Ltd. As he was the only Spartan pilot with the "Argosy" on his ticket, Macintosh flew the machine.

It seems as though K L.M. will have to run purely local services from Holland in the evenings. Passengers from Berlin, Scandinavia, Warsaw, Vienna, Prague, Danzig and various other distant European cities tend to fill all the seats these days. Berck, Ostend and Le Zoute continue to be popular week-end resorts, and services to those places are usually duplicated.

One hears that the conducted air cruise by Polytechnic Tours, in conjunction with Imperial Airways, arranged for July 21, has now been postponed until August 25, at the request of numerous clients who found the first date too early for them.

My collection of true "low flying" stories continues to grow. The historic example is the announcement by some local councillor that he had seen aeroplanes dive under the overhead tram cables on Stafford Road and land over the 7- or 8-foot fence bordering the aerodrome. The latest letter is from a local resident who assures us that whilst he was bending over a seedling in his garden a huge air liner flew so low over him that he feared to assume an erect position. The best "noise" complaint up to date comes from the director of a firm of electric road drill manufacturers.

A. VIATOR

Linking Road and Air at Bristol

Now that Whitchurch has become an air centre of considerable importance—with services running daily to Liverpool, Plymouth, Cardiff, and the Isle of Wight—it is interesting to note that the Bristol Tramways and Carriage Co , Ltd., has officially linked up, and is running a specially equipped and indicated bus between the tramways centre and the airport. Air passengers, too, will now be able to book direct to their destination at the Tramways Company's two principal booking offices in Bristol, as well as at Bath, Wells, Weston-super-Mare, Gloucester, and Cheltenham.

The association of this old-established firm with Norman Edgar (Western Airways), Ltd , and with Railway Air Services, suggests the possibility of future development, and is certainly flattering to the most modern form of transport. Norman Edgar, it is interesting to note, started operations in 1929, at Filton, with one machine, and his fleet now numbers five

Aberdeen Airport Opening

Next Saturday the new Dyce aerodrome at Aberdeen will be officially opened by Viscount Arbuthnot. There will be a display by a flight from the Leuchars R.A.F. base, an arrival competition, a prize for the best aerobatic display, and a "visible" handicap race. No machines must land or take off between 16.00 and 16.30 hours, when the display is taking place.

Birmingham to Cowes

On Monday next Railway Air Services are inaugurating services twice daily between Birmingham and Cowes, using D.H. "Dragons." The journey will take about two hours, a time which includes halts at both Bristol and Southampton. At Birmingham there will be a connection to Liverpool and—when the projected extension line opens—to Belfast and Glasgow.

HESTON

To Paris via Jersey : Contract Maintenance : A Birkett Week and a B.A.N.Co. Day : First Solo Cup Extensions

JERSEY AIRWAYS, LTD., are now running from Jersey to Paris twice weekly, on Mondays and Thursdays. The fares are £3 15s. od. single and £6 5s. return, and a connection may, of course, be made with the Heston-Jersey service by those who like to travel to Paris on the two more picturesque sides of a triangle rather than on the direct route from Croydon. Two-way radio is now being fitted to all Jersey Airways machines.

The Heston "G. E." inspection, or twenty-five-hour schedule, is becoming increasingly popular with private aeroplane owners, many of whom contract for this work over a term of months. Nineteen private and commercial machines are at present maintained entirely by Airwork on contract terms, all work being carried out automatically as it becomes necessary. This figure excludes school aircraft owned by Airwork.

During a recent week twenty-eight private charter flights were made by Birkett Air Service, Ltd. This company has been in operation for less than two years, but has already built up a thriving business, mainly in charter work for the Press. Birkett's has four aeroplanes, a "Gull" for high-speed transport and three "Puss Moths," one of which is stationed at Manchester in charge of Mr. Thorn. The pilots have a reputation for getting through.

Recently Major Digby was caught between two thunderstorms over Towcester, where a man on the ground was killed by lightning the same day, and Mr. Leonard Stace, flying back from the fire at Brownsea Island, came through another nasty area of storm, electrical and otherwise. Both flew blind for several minutes through heavy hailstorms. Major Digby, incidentally, carried films—a depressing cargo to have while dodging lightning.

There are those who tread cautiously on Friday the thirteenth, and the fates played a harmless trick on B.A.N.Co. on that day. One of the Fords had just taken off for Le Touquet when an engine "blew a plug." With multi-engined safety it would have been possible to continue the flight on the other two engines, but the pilot wisely put back to Heston and had the offending plug replaced. But the result was a delay in the outward service to Le Touquet, and further, as this particular machine was scheduled that day to go out again on the second Deauville service, this was in turn held up. An annoying practical joke at the expense of the superstitious. Last Friday was an exceptionally heavy day, ten flights across the Channel being made by B.A.N.Co. machines, and there were charters both to Castle Bromwich and the Isle of Wight.

A typical day in the life of an air taxi is described in the log of B.A.N.Co.'s "Gull": "08.15. Heston for Liverpool, one passenger; 11.50. Newmarket *via* Farnborough, picking up passenger at Farnborough; 14.15. Return from Newmarket *via* Farnborough; 15.50. For Yeovil, press option on continuing journey to Plymouth and return."

The Heston First Solo Cup—a hideous and potentially priceless agglomeration of scrap metal—has acquired an "ornamental base." This is to take the overflow of autographs from the surface of the original cup. The complete collection is tantalising to autograph hunters and may fetch something fabulous at Sothebys, if historical relics of the twentieth century will change hands there in the thirtieth. But what will happen when the new annex is full up?

Indian National Airways

It is anticipated that a weekly service between Karachi and Lahore will be operated by Indian National Airways this autumn. Intermediate stops will be made at Jacobabad, Multan and/or Bhawalpur.

A South African Aviation Journal

From Johannesburg appears an excellent air monthly called "African Travel." The second number has, in addition to numerous articles on air line operation and air port development, a special and well illustrated supplement dealing with the Kruger National Park in the Transvaal.

Judging from the general tone one would imagine that African aviation is developing by leaps and bounds.

Algiers-Congo Experiment

There have been a number of flights during the last five years between Northern Africa and the Congo, but no serious attempt has yet been made to find out whether conditions would allow a regular service. The French Air Ministry has now deputised Comdt. Dagnaux to run a monthly experimental service from Algiers to the Congo, running through Gao, Zinder, Fort Lamy, Banghi and Brazzaville. A three Algol-engined Bloch machine will be used, carrying a 2,204 lb. payload, and cruising at 124 m.p.h.

Himalayan Air Line

A regular air service between Haridwar and Badrinath has been started by the Himalayan Air Transport and Survey Co., and aerodromes at Haridwar and Gauchar have been inspected and approved by the Director of Civil Aviation. The Gauchar landing ground, at one time a mass of rock, is now a full-fledged aerodrome.

Badrinath and Haridwar are both holy places of the Hindu, lying at the foot of the Himalayas, and pilgrims to Badrinath used to take three to four weeks in reaching their destination on foot. They will now reach it in less than 40 minutes! A three-engined machine carrying ten passengers has been employed, and experienced pilots and engineers from England have been engaged.

To Bordeaux and Biarritz

In conjunction with the Air France service between London and Paris, a new week-end trip to Bordeaux and Biarritz will be inaugurated on August 4. Passengers will leave Croydon at 10 a.m. on Saturday, arrive in Biarritz at 6 p.m., leave there at 8.15 a.m. on Monday, and arrive at Croydon at 2.40 p.m. This service will be run daily, Sundays excepted, from August 20 to September 14.

A New Air Line

Within the next few weeks London, Scottish and Provincial Airways expect to start operating a skeleton daily service between an airport in North London and Glasgow (Renfrew), making an intermediate stop at Nottingham (Tollerton). The company will use Airspeed "Couriers," and possibly a couple of "Envoys," but later the service will probably be run entirely with the twin-engined Airspeed type.

P.S. and I.O.W. Aviation News

The traffic figures between Portsmouth and the Isle of Wight are still increasing. Last week 1,545 passengers were carried—an increase of 208 on the previous week's figures. 140 passengers were carried last week, too, between London and the Island, and special charter trips were made to Glastonbury, Rochester, Grimsby and Dorchester.

On August 1 the first of the Airspeed "Envoys" will be put into service on the Island Air Express between Heston and Ryde. The high cruising speed of this machine will shorten the journey by some fifteen minutes.

Hourly Across the Estuary

Since the service was opened during June the little air line between Gravesend and Southend-on-Sea (Rochford) has been markedly successful. It is run "every hour on the hour" from each side—one o'clock in the afternoon being the only absentee in the timetable between 9 a.m. and 7 p.m.

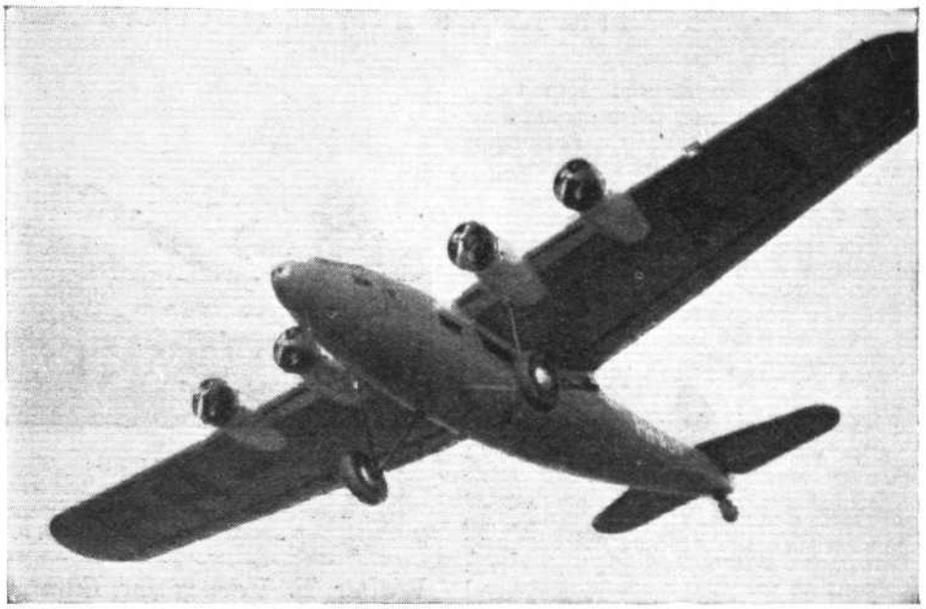
At present there are two machines in service, a Short "Scion" loaned by Short Bros., and a D.H. "Fox Moth." Another "Scion" may be used later on. The name of the operating company is the Southend-on-Sea Flying Services Ltd., and the fares are 12s. return and 8s. single.

THE FOKKER F. XXXVI

A Four-engined Monoplane Carrying 32 Passengers at a Cruising Speed of 163 m.p.h.

TEST flights are at present being made with the Fokker F. XXXVI four-engined monoplane which has been designed to carry thirty-two passengers on European air lines, or sixteen passengers on the Amsterdam-Batavia service. For the latter duty each passenger will have a sleeping berth which may be folded up and transformed into a comfortable seat during the day. A crew of five, consisting of two pilots, a wireless operator, a mechanic and a steward, will be carried, and sleeping accommodation is provided for two members of the crew.

The cantilever wing of this new machine is of typical Fokker construction, but is fitted with trailing edge flaps. Between the spars there are luggage holds with a joint capacity of 318 cu. ft. (9 m^3) and there is another luggage compartment of about 35 cu. ft. (1 m^3) in the fuselage. The span is about 110 ft. (33 m) and the wing area about 1,850 sq. ft. (172 m^2). Four Wright "Cyclone" Series "F." supercharged radial air-cooled engines with three-bladed controllable-pitch airscrews are mounted forward of the leading edge of the wing. Four fuel tanks with a total capacity of 748 Imperial gallons 3,400 litres) are installed in the wings between the spars.



THIRTY-TWO PASSENGERS—174 M.P.H.: The Fokker F.XXXVI is fitted with four Wright "Cyclone" engines which give it a top speed of about 174 m.p.h.

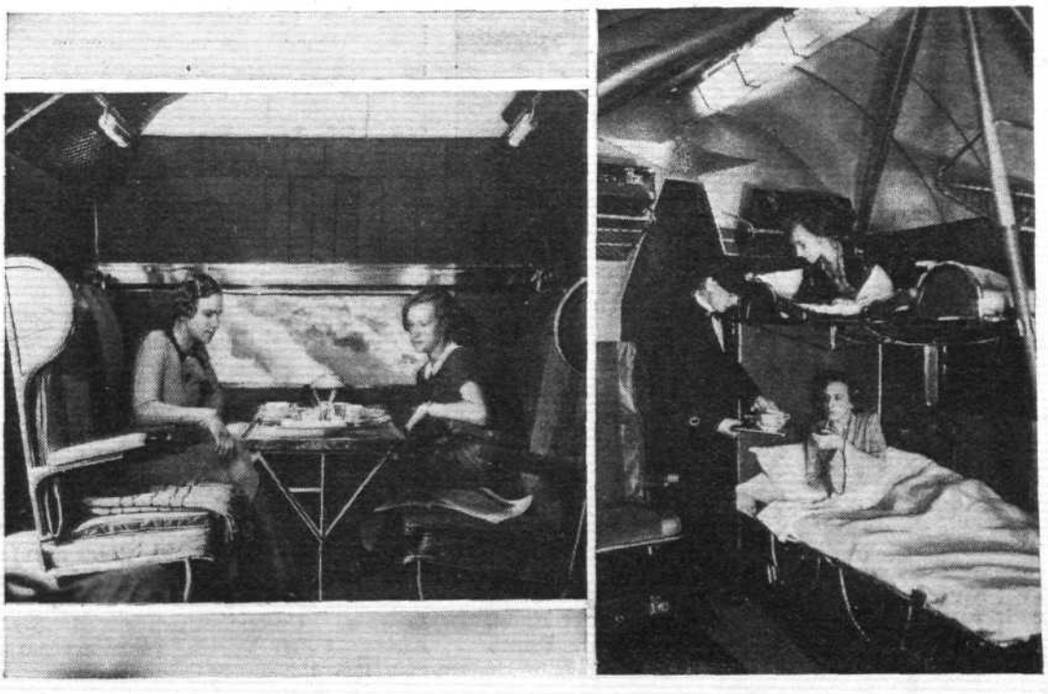
Welded steel tubular construction is used for the fuselage, some of the steel tubes used being as much as 4in. in diameter. The fuselage is of rounded section, and, as there is no covering on the under surface of the centre section of the wing, the space within this portion forms the upper part of the cabin. Fin and rudder are of welded steel tubular construction and covered with fabric. The tail plane and elevators are cantilever structures with wooden spars and ribs, in this case covered with plywood. "Tabs," or flaps, are provided for trimming.

In the nose of the fuselage is the pilots' compartment. The first pilot sits forward in the centre, the second pilot a little to the rear on the starboard side, and the wireless operator faces aft beside the first pilot but rather lower. With this seating arrangement members of the crew can easily communicate with each other. Behind there is a compartment for the mechanic and the chart table. To the rear of this again is a buffet with an electric kitchen as well as a compartment for the steward, and over the front portion of the cabin, in the wing, there is room for two sleeping berths for members of the crew. The cockpit has a separate entrance on the port side of the fuselage.

The cabin is divided into four compartments each with accommodation for four or eight passengers. As the result of thorough sound-proofing, conversation can be carried on without raising the voice. It is even claimed that the sound of the engines does not disturb passengers who wish to sleep. Aft of the cabin there is a wardrobe and two lavatories.

The undercarriage is in two halves. The vertical shock absorber struts run from the front wing spar to the axles, which are attached to the fuselage by "V" struts. Low-pressure wheels with brakes are fitted, and the tail wheel, too, is fitted with a low-pressure tyre.

A useful load of about 13,444 lb. (6 100 kg), or six tons, may be carried, and the empty weight of the machine is approximately 21,820 lb. (9 990 kg). While no actual performance figures are at present available, it is confidently expected that the machine will have a maximum speed of about 174 m.p.h. (280 km/h) and a cruising speed of 163 m.p.h. (262 km/h) at an altitude of 10,000 ft. (3 250 m). The ceiling should be approximately 16,400 ft. (5 000 m). Flying on three engines the F. XXXVI will be able to maintain an altitude of 9,840 ft. (3 000 m) with full load.



LONG-DISTANCE COMFORT: On the left is shown a compartment of the new Fokker equipped for flying by day, and on the right the same arranged for night travel.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

Indian World Flight Starts

Mr. R. N. Chawla, the Indian airman, left Karachi on Friday for England in an attempt to fly round the world.

An Oxford Honour

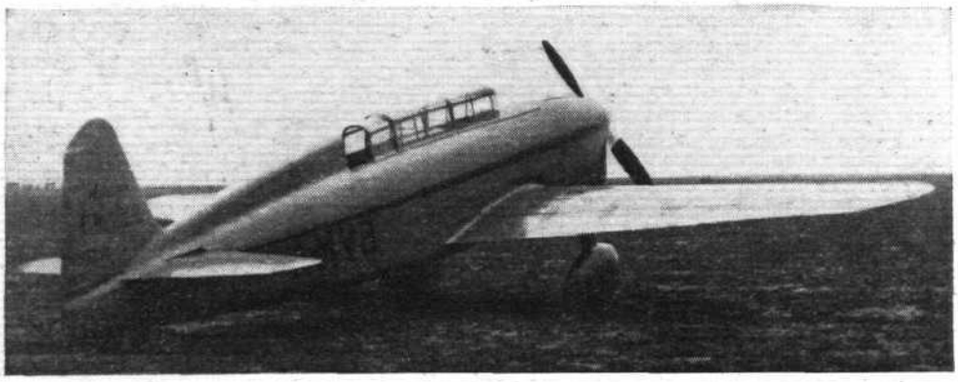
The Hon. Degree of Master of Arts has been conferred, in Convocation at Oxford, on Wing-Commander K. A. R. Park in recognition of his two years' command of the Oxford University Air Squadron.

Victor Smith to Try Again

Mr. Victor Smith, the young South African airman who last year made attempts on the record flights between England and South Africa, is—we are informed by the Vacuum Oil Company—to make another attempt to beat the flying time record between the Cape and London. He hopes to leave Capetown, in his Comper "Swift," on July 26th.

Grierson's Arctic Flight

Once again Mr. John Grierson is attempting a flight from England to Canada *via* the Arctic Air Route. He left Rochester early on Friday in a D.H. "Fox Moth" ("Gipsy Major"), which had been fitted with floats by Short Bros. Flying *via* the Thames to Heston, he then turned overland to the west coast, and crossing the Irish Sea by the Isle of Man alighted in Londonderry Harbour at 11.20 a.m. Here he was held up by unfavourable weather, but reached Reykjavik, Iceland, on Monday. During his flight Mr. Grierson will be carrying out tests with the Marconi-Robinson "Homing" wireless apparatus.



FIRST FOUR PLACES: The Caudron "Raïale" C.50 monoplane (140 h.p. Renault 4-cyl. in line inverted air-cooled engine), which, piloted by Lacombe, won the "12 Hours of Angers" contest. This type also secured second, third and fourth places in this contest.

Walter T. Varney for Europe

Mr. Walter T. Varney, a pioneer of high-speed air transport in America, is coming to Europe this month. Accompanied by his daughter Virginia, he will fly over the "MacRobertson" course to become acquainted with the terrain and conditions. *West Wind*, the Lockheed "Orion" which he will use in the race, is to be demonstrated in Rumania shortly.

Fast Trip to Shanghai

Through the combined use of Imperial Airways and the Glen Line Services, a British business man has completed a trip from London to Shanghai in just over sixteen days. The trip was made as an experiment after the passenger had tried every other known way of making the trip. Between London and Singapore the journey took eight days by air and the Singapore-Shanghai trip was made in 8½ days in m.v. "Glenberg."

Twenty-five Years Ago

From "Flight" of July 24, 1909.

"M. Blériot . . . . has made public a little practical tip which explains how he has so frequently had mishaps without personal injury. At one time, it will be remembered, M. Blériot's early achievements in flight were mainly characterised by more or less disastrous terminations, but on every occasion the aviator himself escaped practically without a scratch. M. Blériot goes to work on the theory that it is impossible to save both the machine and one's self, and further, that if the pilot keeps a cool head he need never be injured. M. Blériot's own plan is to throw himself upon one of the wings of the machine just before the crash, and although this breaks the wing, it has proved equally successful in breaking his fall."

FOR ARCTIC AIR ROUTE: Mr. John Grierson's "Fox Moth" being launched at Rochester, where it was equipped with floats by Short Bros. Mr. Grierson left on Friday on his flight along the Arctic Air Route to Ottawa.

The Modern Lama

The Tashi Lama recently journeyed by air from Nanking to Peking. Eastern habits are certainly changing!

The College of Aeronautical Engineering

The students who entered the College of Aeronautical Enginering at its opening in October, 1931, are now qualifying for the College Diploma. The first seven students to complete their course of training have entered the following appointments on leaving the College:—J. Brown, Assistant Manager to Cinque Ports Flying Club; M. Crossley, Brooklands Flying Club, Ltd.; F. S. Dorabjee, Percival Aircraft, Ltd.; D. Horsfield, Chief of Time Study with General Aircraft, Ltd.; C. Hunter, Airwork, Ltd., Heston; J. Lorentz, Union Airways of South Africa; A. H. Martin, Technical Assistant, Royal Aircraft Establishment.

Saved by Parachute

During a test flight on a new machine on Friday, Ernest Udet, the German "stunt" pilot, lost control at an altitude of 2,500 ft. He jumped from the machine with his parachute and alighted unhurt—the aeroplane crashed and was destroyed.

Italian Stratosphere Aircraft

A special branch of the Italian Air Force, known as the "Height Section," has been formed by the Italian Air Ministry for the study and practical solution of problems connected with the navigation of the stratosphere. A competition among airmen in this branch has also been organised for the construction of machines and engines suitable for stratospherical flying.

German Gliding Meeting

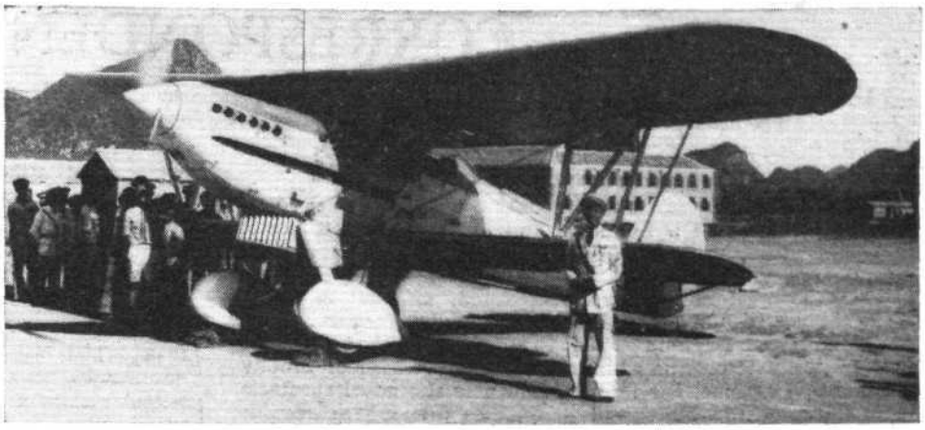
What is claimed to be the greatest gliding competition in the world commenced on Sunday, when the fifteenth annual national gliding meeting of Germany assembled on the Wasserkuppe at Hesse-Nassau, in the Rhön district. The meeting will continue until August 5, and in addition to three main prizes—(a) for the farthest distance flown, (b) for the greatest height reached, (c) for the longest endurance flight—there will be special prizes for "gliding squadrons."

Hotels Catered for!

The managing director of the Egyptian Hotels, Ltd., recently remarked at the annual general meeting of the company that the air traffic had considerably increased since he spoke the previous year. "Three to four times a week," he said, "passengers from Imperial Airways, Royal Dutch Air Lines, as well as other lines, call on us and spend the night in one of our hotels, coming from England, Amsterdam, Brindisi, Athens, as well as from Java, Bagdad, Capetown and British East Africa."

America Also

The Aviation Investigation Committee, appointed by Mr. Newton T. Baker, U.S. Secretary for War, has announced a recommendation that immediate action be taken to strengthen the U.S. Army Air Force sufficient to meet "the most serious threat of war against our country that can be conceived." The committee also calls for immediate and extensive modernisation by: The extension of the force to 2,320 aeroplanes, as provided for in the Congressional Act, 1926; encouragement of the aviation industry for the purpose of guaranteeing swift and efficient expansion in war time; increase of the Air Force personnel by 403 officers.



A "FOX" IN CHINA: A Fairey "Fox" Mk. IV (R.R. Kestrel IIs) is being demonstrated in China. The authorities are very impressed by the machine and have indicated that it is far ahead of anything they have seen. The most prominent figure in the picture is Colonel Wu, of the Kwangsi Air Force, who shot down a Japanese aircraft during the Sino-Japanese troubles at Shanghai. Colonel Wu has flown the "Fox."

"Model Engineer" Exhibition

The sixteenth annual "Model Engineer" exhibition of engineering and marine models, tools and light machinery, will be held at the Royal Horticultural Hall, Westminster, from September 6 to 15.

Aerial Attack on Paris

About 200 aeroplanes will take part in a mock bombing attack on Paris, and in its defence, at the end of August. One hundred of these machines will descend on Paris from Metz, while the other machines will be sent from Tours to defend the city. The Council of the Seine Department has approved the expenditure of 20,000,000 francs (about £250,000) for organising civilian defence against air attacks, and for the practical test of the plans for defending Paris from the air.

An Echo of the King's Cup

"Please convey to Flight Lieutenant Schofield the King's sincere congratulations on winning the King's Cup today," was the telegram received by the Royal Aero Club from H.M. The King.

Following close upon the success in this year's race comes the announcement that the Air Ministry have ordered from General Aircraft, Ltd., on behalf of the Department of Civil Aviation of Australia, a Monospar S.T.11. This machine, a retractable undercarriage version of the S.T.10 King's Cup winner, will be employed on the services of the Department. It will have a top speed of 160 m.p.h., a cruising speed of 150 m.p.h., and a range (at cruising speed) of over 1,100 miles.

Soviet Glider-design Competition

A competition for the construction of a cheap glider of maximum safety to be used for training purposes and designed for mass production has recently been announced by the central council of Osoaviakhim. Two prizes will be awarded for the best designs, one of 10,000 roubles and the other of 5,000 roubles.

A Hospital Aerodrome

In making the purchase of a fifty-acre site at Merrion, on the outskirts of Dublin, it is understood that St. Vincent's Hospital, one of the largest medical institutions in Ireland, has taken into consideration the arrival of country patients by air. A bi hospital is to be erected on the estate, but space will be reserved for aircraft arriving with urgent cases in order that the patients can be landed right at the hospital door and not have to make a nine-mile drive from Baldonnel aerodrome to the city.

French Engines in Fairey's

Hispano-Suiza engines of the "X" and "Y" types have been fitted experimentally in Fairey "Foxes" and "Fireflies" in Belgium. The "Fox" with the Ybrs geared and supercharged engine (650/860 h.p.) has a top speed of 216 m.p.h. and climbs to 14,760 ft. in 6½ min. The "Firefly" single-seater using the Xbrs (500/650 h.p.) as power plant reaches about 220 m.p.h. at 11,480 ft., and can climb to 22,960 ft. in 10 min. 25 sec. A new system of cockpit protection has been developed for the "Fox."

Diary of Forthcoming Events

Club Secretaries and others are invited to send particulars of important fixtures for inclusion in this list:

July 28. Burnham-on-Crouch Aerodrome: official opening by the Duchess of Bedford.
July 28. Bristol and Wessex Ae.C. Garden Party.
July 29. London-Sherburn Race (York County Aviation Club).
Aug. 11. London-Newcastle Race (Newcastle-on-Tyne Ae.C.).
Aug. 15. Air Tour of Italy.
Aug. 17-Sept. 6. Copenhagen Aero Show.
Aug. 18. Cotswold Aero Club Air Rally and Garden Party
Aug. 25. Liverpool and District Ae.C. Garden Party, Speke Aerodrome.
Aug. 28-Sept. 16. International Touring Competition, Poland.
Sept. 1-2. Cinque Ports Flying Club International Rally, Lympne.
Sept. 1-9. National Soaring Competition, Sutton Bank.
Sept. 8. Official Opening of Walsall Aerodrome.
Oct. 6. London to Cardiff Air Race and Cardiff Ae.C. Garden Party.
Oct. 7. Aviation Golf Meeting, Royal Porthcawl Golf Club, Porthcawl.
Oct. 20. England-Australia Race for MacRobertson Prize.
Nov. 16-Dec. 2. 14th International Aviation Exhibition, Grand Palais des Champs-Elysees Paris.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

INTEREST IN AIR RACING

[2945] As one who saw the King's Cup race in its early days and as one who, as a Londoner, has not bothered to see it in recent years, may I be permitted to express my humble criticism of your Editorial opinion in last week's issue of *Flight*? Two alternatives were suggested, (a) that in future it should be a seaplane race, and (b) a landplane race to be held in the North of England. From this I presume that you have in view the vast crowds which attended the Schneider Trophy Race and, I assume, the interest shown in the novel spectacle —to those of the North—of aeroplanes arriving at regular intervals at certain northern aerodromes. Frankly, as a Londoner who knows little or nothing about the intricacies of modern aircraft, the latter spectacle lacks appeal—we can see it every evening if we so choose. As regards the former there is something vastly different.

Machines travelling at 400 m.p.h. look fast and sound fast—it was a spectacle, terrifically exciting and awe-inspiring to those who knew nothing about it. And here is, to my mind, the important point. Although the machines were flying at intervals round a short course, there was no such thing as handicap. I know, if I suggest it, that any number of difficulties will arise, but may I make a plea for a race to be held round a short course in the vicinity of London, in which there is a capacity limit—say, of 200 h.p.—in which machines are sent off at half-minute intervals, to cover ten laps. Continuous lap-leader boards at aerodromes *en route*, run something on the lines of the motor cycle T.T. races in the Isle of Man, could add to the public interest. This would, I think, evolve a special sports type of machine which would be improved as the years go by. Also private owners could be catered for by the inclusion of a sealed handicap. Obviously entries would be small for the first year or so, but I honestly believe that as a result of such a race far greater and keener interest of the right type would be evolved and your Londoner *might* even begin to show fresh interest in the actual landing of 'planes at an aerodrome than he does at the moment.

London, S.W.16. C. R. H.

[We agree with our correspondent that racing over a very short course, with the machines in sight the whole time, *is* thrilling. Very! But it is also highly dangerous. We had a most lamentable example of this at the Bournemouth meetings some years ago. Competitors get bunched together at the pylons, and the danger of collision is so great as to make this form of air racing not worth while. The only alternative would be to use slow machines only, such as the Lowe-Wylde "Drones."—ED.]

ENGINE RELIABILITY

[2946] On page 727 of the July 19 issue of *Flight* under the heading "The Outlook," your contributor refers to the poor reliability of racing car engines compared with aero engines.

It is not, however, possible to compare the two types, as the racing car engine, on an average, is giving about three times the horse-power per litre of the average aero engine used, say, in the King's Cup Air Race. Both engines are produced for entirely different purposes, and cannot be compared for reliability, as the conditions are so entirely different. R. C. CROSS.

Odd Down,
Bath

[2947] I was interested in your remarks in your July 19 issue in respect to engine reliability, particularly in your comparisons with motor car racing. I should like to point out that engine speeds are very much higher in a racing car than in an aeroplane such as those taking part in the King's Cup Race. The highest probably was (I am open to correction) the 90 h.p. Pobjoys, fitted to the Monospar S.T.10 revving at 3,500.

The average racing car engine turns over at least 6,000 r.p.m., and even 6,500; these speeds are even obtained on a racing single-cylinder motor cycle engine.

Apart from the r.p.m. being considerably higher, great stresses are imposed on all working parts when sudden acceleration and deceleration takes place, and compression ratios are much higher also.

Such alternating stresses are definitely not imposed on aero engines, and although they may run at full throttle, their engine speed is slow in comparison, and without such violent variation. I. H. NEWMAN.

South Norwood,
London, S.E.25.

SAFETY FIRST

[2948] The last paragraph of the leading article entitled "More Squadrons," in *Flight* of July 19, which starts: "In particular there are too few manufacturers of aero engines," and which ends, "we should very much like to see that side of the industry established on a broader basis," has been read with considerable concern by aero engine manufacturers who are members of our society.

Our members are of opinion that it is unprofitable and useless to draw comparisons between conditions which existed at the beginning of the Great War and those which exist to-day.

In 1914 there was no effective aero engine constructing industry in this country, whereas ever since the War there has been a virile industry which it has not been possible to employ fully with orders for civil or military engines.

This industry, which can claim to possess the highest technical and administrative knowledge, is quite capable of supplying all the engines which might be required by the Air Ministry in a time of national emergency, and it should not be assumed in a newspaper article that the firms which now exist are not able to meet the requirements of an emergency, or that this country would be dependent on foreign sources of supply for our engines.

Our society is of the opinion that statements of this kind in the British aeronautical technical press lead to misunderstanding, and cause the uninitiated to draw the inference that the British aircraft industry might be incapable of meeting the needs of the Royal Air Force; this is not so, and never will be so, and therefore our society ask that greater care be taken in the future in regard to the substance of your articles when they touch on matters dealing with the efficiency of the aircraft industry. H. R. GILLMAN, Secretary.

The Society of British Aircraft Constructors, Ltd.,
London, W.1.

[Safety First was the burden of the comment to which the S.B.A.C. draw attention. No reflection upon the efficiency of the aircraft engine industry was suggested or inferred in our comment, for we give way to none in our admiration for British aero engines and their achievements. The observation was made on the same principle which prompted the Government to examine the position of Woolwich Arsenal, viz., the vulnerability in time of war or national emergency. If we are solely dependent upon, say, one factory for the supply of all engine requirements, the risks obviously in such circumstances, and in case of fire, strikes and lock-outs, are greater than if we had, say, ten widely spread factories capable and accustomed to producing our engine supplies.—ED.]

IRISH-BUILT MONOPLANE TESTED

[2949] Your reference to a monoplane being designed and built by Mr. Joseph Gilmore, ground engineer to the Irish Free State Air Corps, and appearing in the current issue, is incorrect. This aircraft is a rebuilt Civilian Coupé, Genet engine, which was purchased by him in England last year, and crashed at Stranraer when flying this machine back to Ireland. It has been rebuilt with the aid of the staff of the Irish Aero Club, and was recently submitted for renewal of C. of A. Furthermore, it is doubtful whether a C. of A. would be renewed for this machine in England, taking all the circumstances of the case into consideration. As up till the present the writer has never known of any of the strict detail inspection which is to be found across Channel, and called for by the A.I.D. before certificates are recommended by them. Finally, no aircraft or aero engines have ever been designed and built in Ireland that could fly, except Harry Ferguson's of the old days. "A" LICENCE.

Belfast.

[We are glad to have this correction of a news item which reached us from a source we have hitherto found reliable. —ED.]

July 26th, 1934

Supplement to FLIGHT

766a

The AIRCRAFT ENGINEER

"FLIGHT"

ENGINEERING SECTION

Edited by C. M. POULSEN

No. 102 (Volume IX No. 7) 9th Year

July 26, 1934

THE AUTOMATIC CONTROL OF AIRCRAFT

By G. R. M. GARRATT, M.A. (Cantab.)*

The Automatic Pilot has been in continuous use in the Royal Air Force for five years, and forms part of the standard equipment of large machines such as night bombers. Recently the instrument has been approved for use in civil aircraft, and there is little doubt that in certain classes of civil work it will be found as useful as it already has proved in military flying. Smith's Aircraft Instruments control the Patent Rights throughout the world.

In the article of which the first instalment is published this week, Mr. Garratt, of the Technical Development Staff, Farnborough, describes the principle and details of the two-axes Automatic Pilot, which has been developed by the Scientific Research and Technical Development Staffs of the Air Ministry, notably by Messrs. Meredith, Cooke and Kerr, of the R.A.E.

THE general problem of the automatic control or stabilisation of aircraft has received consideration in many different countries, and although many inventions have been recorded, there is little data available of the results which have been achieved. The instrumental problems and the aerodynamic requirements are not easily satisfied, and the credit for the practical development of the automatic pilot in this country belongs very largely to Mr. F. W. Meredith, Mr. P. A. Cooke and Mr. P. S. Kerr.

The principal objects of automatically-controlled flight may be briefly summarised as follows:—

1. Reduced fatigue for the pilot, who is able, when necessary, to leave his seat or to attend to other duties, such as navigation or the operation of his radio equipment.
2. Greater accuracy of control and course-keeping.
3. Reduced risk of loss of control in bad weather, or during night-flying.
4. Improved stability of the aircraft when accuracy of flying is of importance, e.g., air survey and photography.

There are a large number of possible forms of automatic control, and while some of them might be practical, others would be impossible of satisfactory achievement. For example, one might consider an azimuth control depending fundamentally upon a magnetic compass or upon some detector of the sun's rays. One might equally consider a pitch control depending on air speed, altitude, acceleration, the rate of change of altitude or on almost any function which varies with the pitch attitude of the aircraft. The main disadvantage of such controls, however, would be the fact that they would be useless unless they were applied to a completely stable aircraft on account of the phase and time lag which would be involved.

An aircraft in steady flight frequently receives disturbances, and it depends on the stability characteristics of the aircraft what form of motion will result from the initial disturbance. Assuming a stable aircraft, a complex oscillation will generally be set up, and when the oscillation is eventually damped out the aircraft will usually be flying on a new course. The first function of an automatic control should, therefore, be to counteract the effect of the initial disturbance and to ensure that the aircraft returns to its original course. Some datum is necessary from which it is possible to detect any deviation and to which the course may be reset. In preference to such unreliable data as the earth's magnetic field or the sun's rays, the gyroscope is supreme.

A carefully balanced spinning gyroscope has the property of keeping the direction of its axis fixed in space unless acted upon by some external force, and this characteristic stability is used in a few of the largest liners to reduce the

* The author desires to acknowledge the courtesy of Messrs. Smith's Aircraft Instruments in providing the facilities for the production of the illustrations in this paper.

rolling of the vessel. The direct use of a gyroscope to provide stability in an aircraft would, however, be quite impossible on account of the prohibitive weight. The gyroscope used for controlling an aircraft provides only an accurate datum from which deviations can be detected, and to which the craft is directed when a disturbance has occurred.

Since the gyroscope itself does not provide stability, the aerodynamic characteristics of the aircraft must receive some consideration. It must be remembered that while the degree of stability of an aircraft in pitch and in roll is largely under the control of the designer by suitable disposition of the wings and tail surfaces in relation to the centre of gravity, it is not possible to design an aeroplane to have inherent directional stability. In other words, no aeroplane could be designed to maintain its flight upon a predetermined course without some form of control.

The first essential feature of any automatic control is, therefore, that it shall be capable of directing the aircraft along a predetermined course, and it is only essential to control the pitching motion of the craft if it is unstable in pitch, or if a rapid damping of a pitch oscillation is required. In practice, however, a single gyroscope is capable of providing control about two axes, and it is usual to control the aircraft both in azimuth (i.e., directionally) and also in pitch.

Stability in roll is very largely determined by the dihedral angle, and control of the ailerons is not usually necessary except for certain special purposes. In this paper we are only concerned with the control of rudder and elevator movements.

The Importance of Stability

Since the gyroscope is only the datum to which the aircraft is controlled, it is of importance to consider the effect of applying corrections when a deviation is detected. Considering the rudder movements, for example, it would be feasible to apply a correction of fixed amount as soon as an error in course is detected, and to reverse the direction of the correction as soon as a reversal in the sign of the error is indicated. Such a control would, however, cause the rudder to move in a "bang-bang" fashion, and as a result the motion of the aircraft would be continually disturbed.

A great improvement is effected by arranging that the amount of rudder angle applied varies directly with the displacement of the aircraft from the datum line. The motion resulting from this form of control will generally consist of a complex oscillation, the damping of which is of considerable importance. Negative damping is, in fact, by no means impossible with such a control. By negative damping we mean that the amplitude of the oscillations would continue to increase instead of dying away. Disaster would obviously be the consequence of an uninterrupted negatively damped oscillation. While a full explanation of the reasons for the setting up of an oscillation would require mathematical treatment and would be out of place in these pages, a brief explanation is required.

It must be remembered that a movement of any one of the control surfaces not only exerts a primary effect about its own axis, but, in addition, it usually has important secondary effects about the other axes. "Aileron drag" is, perhaps, the most familiar example of this secondary effect, when the depression of an aileron so increases the drag on that side of the aircraft that the machine yaws to one side in consequence, in addition to the primary rolling movement. Similarly, a movement of the rudder not only causes a yawing movement, but also introduces roll and sideslip. It is these secondary effects which complicate the damping of an oscillation.

Fortunately, there are two methods by which satisfactory damping of the disturbed motion may be produced. The first method was originated by the Sperry Gyroscope Company, and consists in applying a movement of the ailerons in proportion to the roll displacement. This, however, involves the use of a second gyroscope, and is therefore a serious complication. The second method, which is due to Mr. F. W. Meredith, consists in applying rudder angle in proportion to the roll displacement. The total application of rudder angle is therefore the sum of two amounts, one being determined by the angle through which the aeroplane has turned off its course, and the other being determined by the angle to which the aeroplane is banked.

It was predicted by mathematic investigation, and confirmed by practical experiment, that the application of rudder angle when the aircraft is banked tends to increase the lateral stability of the craft in much the same way as if the ailerons were used to correct the bank.

The application of rudder angle in response to a roll displacement is accomplished in a very ingenious but simple manner by tilting the axis of the gyro rotor upwards in the forward direction. As will be seen later, from the detailed description of the gear, the effect of inclining the forward end of the gyro axis upwards is to cause a relative movement between the gyro axis and the aircraft when the machine banks, and this relative movement causes the application of rudder angle, even though the aircraft has not rotated about the azimuth axis. By this means, adequate damping of the disturbed motion is achieved and lateral stability assured without the added weight and complication of a second gyroscope, which, for all ordinary purposes, is quite unnecessary.

The Automatic Pilot

Having thus briefly outlined the essential features of an automatic control and the aerodynamic requirements to be satisfied, we may proceed to a more detailed description of the Automatic Pilot, familiarly referred to as "George," which has been developed at the Royal Aircraft Establishment, and the patent rights of which are now controlled by Smith's Aircraft Instruments throughout the world.

Unlike some other systems, the Automatic Pilot described below depends on pneumatic means for its operation. The use of compressed air has so many advantages

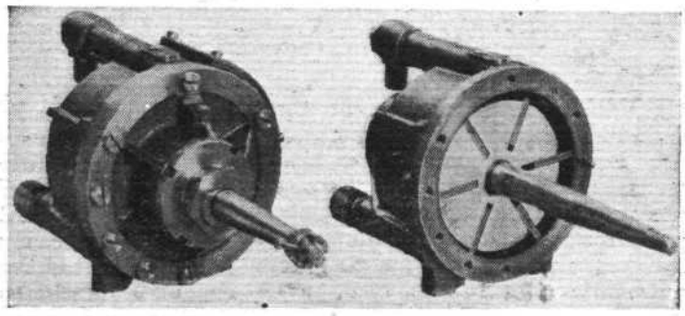


FIG. 1.—Air Compressors, showing Interior Details.

over electrical operation, particularly in that it results in an exact and almost instant response of the control surfaces, that it is most improbable that it will be superseded. So far as the actual gyroscope is concerned, there is little to choose between electrical or pneumatic operation. It is in the means whereby a relative movement between the aircraft and the gyrosocope is translated into a movement of the control surfaces that the pneumatic system demonstrates its superiority. In an electric system a relative movement between the gyroscope and the aircraft has to complete a circuit which brings some form of reversing motor into operation. No matter what form this motor may take, it must possess considerable inertia, and the resulting lag of the control surfaces seriously affects the damping of an oscillation. The small amount of power available from an electric motor without reduction gear-

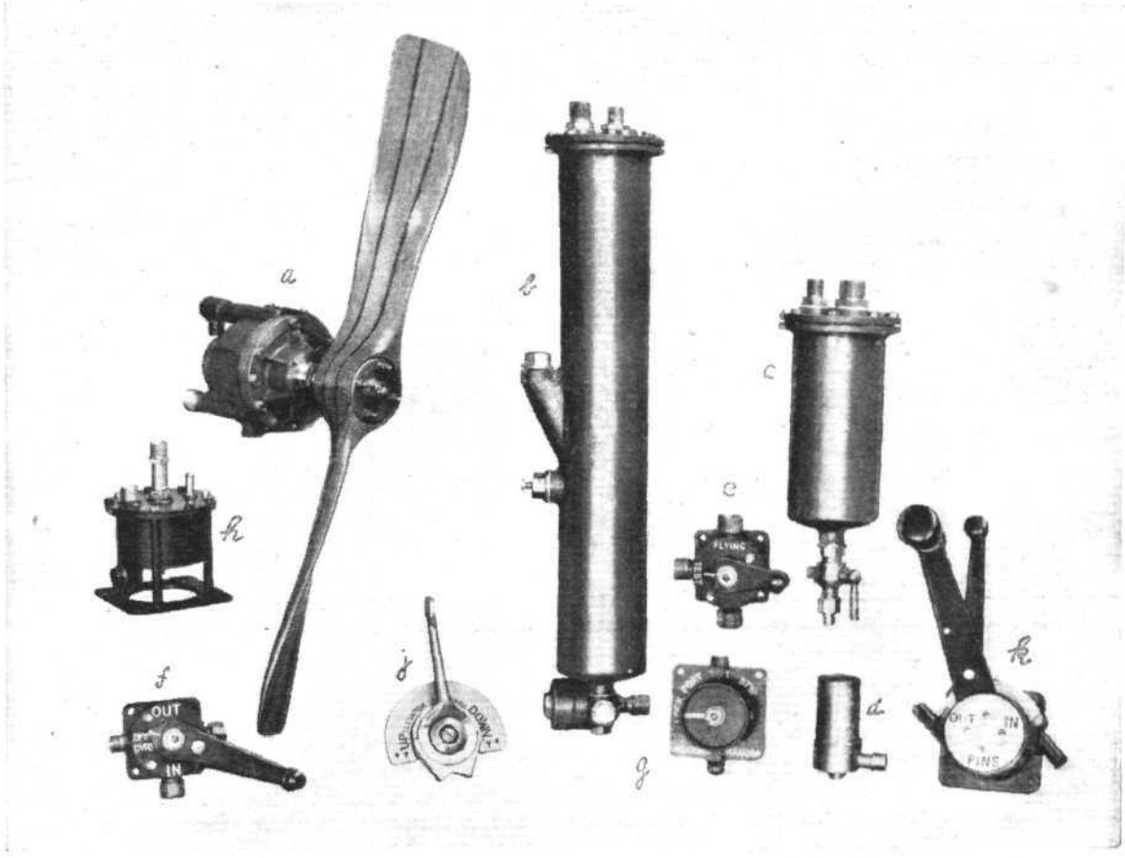


FIG. 2.—Component Parts of Compressor System, and Control Levers. a, Compressor and Windmill. b, Oil Reservoir. c, Oil Separator. d, Pressure Relief Valve. e, Test Cock. f, Main Control Cock. g, Course-change Cock. h, Air Expansion Chamber. j, Pitch Control Lever. k, " Pins " Lever.

ing is a further argument against the use of an electric system, and the introduction of reduction gearing further increases the time lag with consequent loss of damping.

The quantity of air required is of the order of four cubic feet per minute, compressed to a pressure of 30-35 lb. per sq. in. While such a supply is not large, it is beyond the capacity of compressed air bottles, and a compressor system is a necessity.

Compressor System

The compressor system has been designed to operate for long periods without attention, and possesses several unique features. A rotary type of compressor is used, which may be driven from the engine, but which is more usually mounted on a wing and driven by a small windmill by which it is driven at a speed of 1,200-2,400 r.p.m. The interior construction of the compressor is shown in Fig. 1. As may be seen, an eccentrically placed rotor has slots cut in it, in which hardened steel blades can slide under the action of centrifugal force. Air is drawn in through the inlet port and compressed by the rotation of the blades to the outlet port at the side.

Unless the clearances between the ends of the blades and the case were very small, such a compressor would be very inefficient if some satisfactory seal were not provided. It is found, however, that if a copious supply of oil is continually fed to the compressor a very satisfactory performance results, besides being accompanied by the minimum of wear. Referring to the diagram of Fig. 3, the oil is supplied to the compressor through the jet A, and is ejected from the compressor with the compressed air, in the form of an emulsion, to an oil reservoir. The emulsion is thrown against the walls of the reservoir through a jet, and this action causes the oil to flow to the bottom while leaving the compressed air nearly free of oil. An outlet is provided at the bottom of the reservoir, to which a filter is fitted through which the oil passes again to the inlet jet on the top of the compressor. The size of the inlet jet controls the quantity of oil supplied.

The compressed air, as shown in the diagram, passes away from the top of the reservoir to an oil separator interposed between the compressor system and the automatic gear. The function of the separator is to extract the finer globules of oil, which it does by means of a jet through which the air impinges on a small plate. The oil separator is fitted with a drain cock at the bottom through which the oil collected may be periodically removed, while the compressed air is supplied to the gyroscopic apparatus and associated mechanisms from the outlet pipe at the top of the separator.

Simple Gyroscopic Theory

In order to convey a true understanding of the operation of the Automatic Pilot, it is necessary to describe very briefly the simple properties of a gyroscope, but for a more complete account of the principles underlying gyroscopic action, the reader must refer to any of the standard text-books on dynamics.

Any rotating body has the property of tending to maintain the direction of its axis fixed in space unless acted upon by some external force. The greater the angular momentum (or mass, radius, and angular velocity) of the spinning body, the greater is the tendency to maintain the fixed direction of its axis.

The second property of a gyroscope which must be described is the apparently peculiar manner in which it responds to the application of an external force. In Fig. 4 a spinning gyroscope is shown mounted in gimbal rings

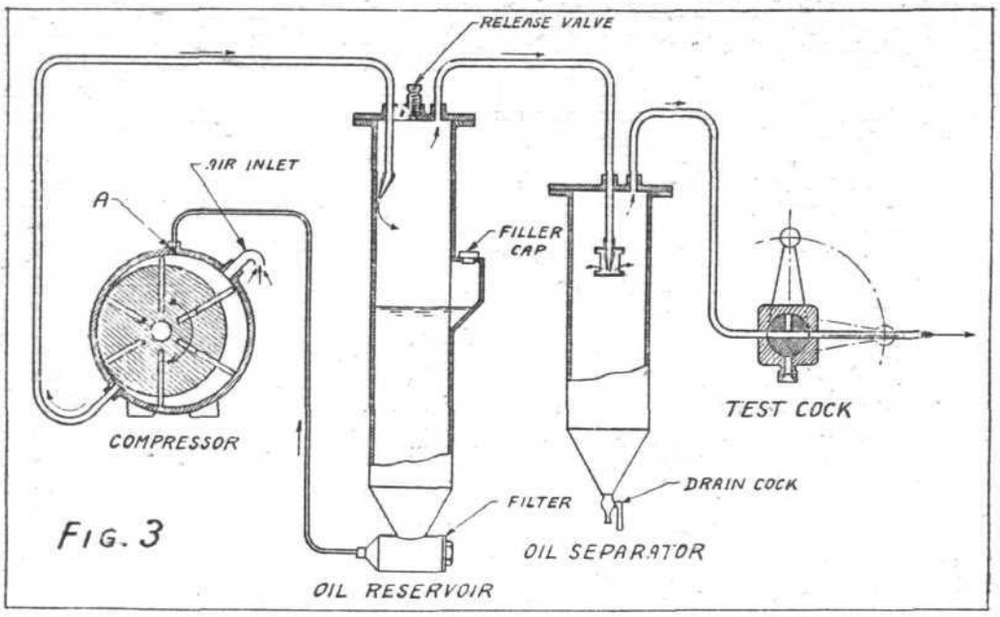


FIG. 3.

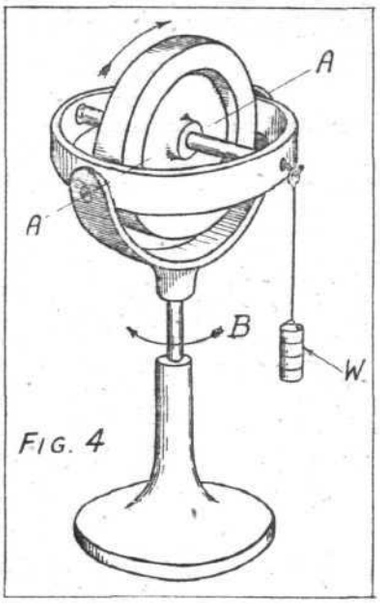


FIG. 4.

FIG. 3.—Diagram of Compressor System, and FIG. 4.—Diagram of simple Gyroscope.

which are free to rotate about their respective axes as shown. Let it be supposed that a torque is applied to the inner ring about the axis A-A by the addition of a weight W to one side of the ring. A casual observer unacquainted with gyroscopic action would assume that the weight W would cause the ring and the gyroscope to rotate or tilt about the axis A-A, allowing the weight to fall. He would, however, be wrong. In actual fact, the gyroscope and the gimbal rings would rotate (or "precess") in azimuth, *i.e.*, about the vertical axis B as shown by the arrow.

An explanation of this property would be out of place and too lengthy for these pages, and the reader must refer to a text-book for a detailed account. Throughout the following description the reader is asked to bear in mind that if a gyroscope is spinning about any given axis and a torque is applied about an axis at right angles to the axis of spin, then the gyroscope will *not* rotate about the axis of the applied torque but will precess about an axis at right angles to both the axis of spin and to the axis of the applied torque.

(To be continued).

THE POLAR DIAGRAM

The Elements of a Method of Stressing Beams under Compressive End Load

BY EDGAR H. ATKIN

(Continued from p. 47)

THE next case of importance is as follows :—

CASE IV.

Beam subjected to compressive end load, a distributed load changing in magnitude at one or more points along the span, and with or without end moments.

To fix our ideas let us assume that one end of the beam has a positive distributed load w_1 and the remainder a positive distributed load w_2.

Having started as in Case II, calculate both $\frac{w_1}{\mu^2}$ and $\frac{w_2}{\mu^2}$

As w_1 and w_2 are positive $\frac{w_1}{\mu^2}$ and $\frac{w_2}{\mu^2}$ are negative and, therefore, the corresponding arcs are placed in the negative direction, as shown in Fig. 9.

The end moments are measured off and the perpendiculars to OA and OB drawn as in previous cases. It will be noted that these end moments are positive. Let these perpendiculars be A_1X_1 and B_1Y. Take any point P on A_1X and draw PQ parallel to the dividing line OC corresponding to the change in w. If R and S are the points in which the arcs of radius $\frac{w_1}{\mu^2}$ and $\frac{w_2}{\mu^2}$ respectively meet OC, then the sense of PQ is the same as the sense of RS.

Through Q draw QX_2 to meet B_1Y in X_2, and through X_2 draw X_2X_1 parallel to PQ to meet A_1X in X_1.

On OX_1 and OX_2 as diameters draw the arcs A_1D and B_1E respectively.

The bending moment diagram is the part shown shaded in Fig. 9.

The direction in which PQ is drawn can be decided quite simply if the reader remembers that there can be no sudden change of bending moment at the dividing line OC.

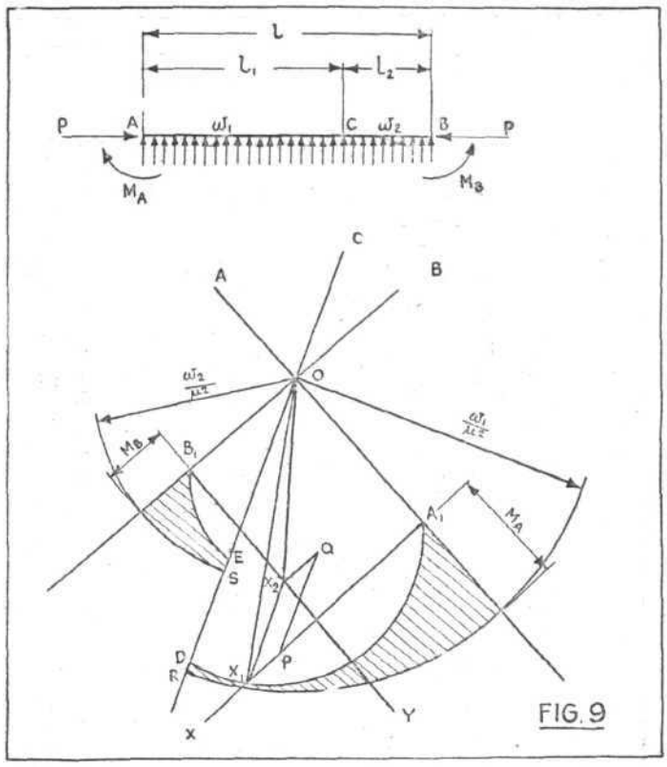
Example (3)

A steel beam 80 in. long, with a moment of inertia of .35 in.^{4}, is subjected to a compressive end load of 7,800 lb., a positive end moment at A of 4,000 lb. in. and a positive end moment at B of 5,890 lb. in. A distributed load of 6.3 lb./in. run over AC_1 and a distributed load of 8.1 lb./in. run over CB.

$AC = 30$ in. $CB = 50$ in.

The diagram for this example is shown in all its constructional details in Fig. 10.

It should be unnecessary to repeat in terms of numerical quantities the construction already described. The follow-



Beam under compressive End Load and a distributed Lateral Load, changing in Magnitude in the Bay.

ing figures will enable the reader to follow the drawing of the diagram through for himself.

$$\mu = \sqrt{\frac{7,800}{.35 \times 3 \times 10^7}} = \sqrt{.000743}$$

$$= \frac{.02725}{}$$

$$\alpha AC = 30 \times 57.3 \times .02725 = \underline{46.8 \text{ deg.}}$$

$$\alpha CB = 50 \times 57.3 \times .02725 = \underline{78.1 \text{ deg.}}$$

$$\text{Total Angle } \alpha = \alpha AC + \alpha CB = \underline{124.9 \text{ deg.}}$$

$$\frac{wAC}{\mu^2} = \frac{6.3}{.000743} = \underline{8,470 \text{ lb. in.}}$$

$$\frac{wCB}{\mu^2} = \frac{8.1}{.000743} = \underline{10,890 \text{ lb. in.}}$$

The distance $X_1 X_2$ (or PQ) parallel to OC is, therefore,

$$\frac{w_{CB}}{\mu^2} - \frac{w_{AC}}{\mu^2} = 10,890 - 8,470$$

$$= \underline{2,420 \text{ lb. in.}}$$

CASE V.

Beam subjected to compressive end load, a uniform distributed lateral load, end moments and one or more changes of moment of inertia in the bay.

All the necessary quantities, μ_1 μ_2 . . . ; α_1 α_2 α_3 . . . ; $\frac{w}{\mu_1^2}\frac{w}{\mu_2^2}$ . . . are calculated as usual. It will be noticed that this time $\frac{w}{\mu_1^2}\frac{w}{\mu_2^2}$ differ, because of the differences in the moments of inertia; in Case IV these quantities differed, because of the differences in the lateral distributed load.

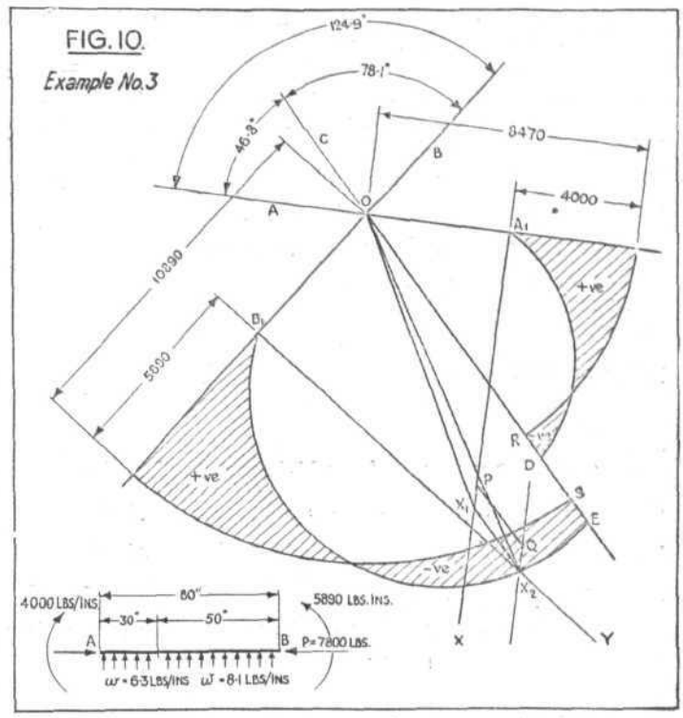
To simplify the description of the method, it will be assumed that w is constant over the whole span, and that there is only one change of I in the bay. Let the moments of inertia over AX and XB be I_1 and I_2 respectively, and for definiteness assume that $I_1 > I_2$.

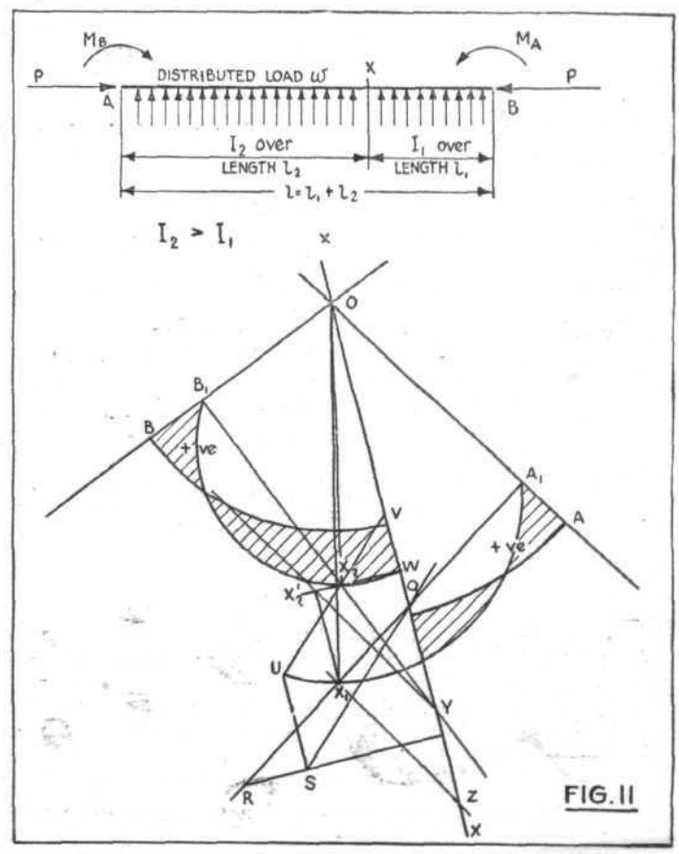
It is useful to note that because $I_2 > I_2$ therefore $\mu_1 < \mu_2$, and, other things being equal $\frac{w}{\mu_1^2} > \frac{w}{\mu_2^2}$.

The method of constructing the diagram is as follows (see Fig. 11): Having set off the various lines OA, OB, OX, at the correct angles and put in the arcs of radii $\frac{w}{\mu_1^2}$ and $\frac{w}{\mu_2^2}$ set off the end moments AA_1 and BB_1 and draw normals A_1R, B_1T to OA and OB through A_1 and B_1 respectively. A_1R intersects OX in Q_1.

Through any point R on A_1R draw RX perpendicular to the dividing line OX and divide RX at S, so that $\frac{RX}{RS} = \frac{\mu_2}{\mu_1}$ and join RQ.

As an aid to memory, it should be noted that the angle $R\widehat{Q}X$ which the locus of the vertex for AX makes with





Beam under compressive End Load and Lateral Load with a Change in Moment of Inertia in the Bay.

OX is greater than the angle $\widehat{SQX}$ which the adjusted locus RQ makes with OX, and that AX is stiffer than XB. In other words: in passing from a part of the beam to another part *less stiff* the angle through which the locus is turned *reduces* the angle which the adjusted locus makes with the dividing line.

Along OX set off in the positive direction a distance QV equal to $\left(\frac{w}{\mu_1^2} - \frac{w}{\mu_2^2}\right)$ and through V draw UV parallel to SQ. UV is then the final adjusted locus and cuts B_1T in X_2, the vertex for the length XB.

Since X_2 is now known, the construction can be repeated from the end B and X_1 found. To do this draw X_2W perpendicular to OX and divide X_2W, so that $\frac{X_2W}{X_2{}^1W} = \frac{\mu_1}{\mu_2}$ and join $X_2{}^1Y$.

Along OX measure off from Y distance YZ in the positive direction equal to $\frac{w}{\mu_2^2} - \frac{w}{\mu_1^2}$ and through Z draw ZX_1 parallel to $X_2{}^1Y$ to meet A_1R in X_1, then X_1 is the vertex for the length AX, and circles on OX_1 and OX_2 as diameters complete the diagram.

In this case the number of degrees in the sector AOX corresponding to a unit of length of AX is not the same as the number of degrees corresponding to a unit of length of XB.

This obtains generally: in more complicated cases a different angular scale must be used for each part of the beam into which the "jumps" of moment of inertia divide it.

It is also to be borne in mind in calculating the true shear that the appropriate vertex and value of μ for the segment under consideration must be used. The actual position of a vertex is no indication that it applies to a given segment. It is only by following the construction rigorously that diagrams of unusual shape can be exactly drawn.

Example (4)

A steel beam AB, 95 in. long, is so constructed that 45 in. of its length from A to X has a moment of inertia of .32 in.^{4} while the remaining length has a moment of inertia of .4 in.^{4}

There is a uniform distributed upward loading of 7·5 lb./in. over the entire length and a compressive end load of 7,000 lb.

The end moment at A is 3,500 lb./in. clockwise externally to the left, there is a moment at B_1 of 3,000 lb./in. anti-clockwise externally to the right.

The necessary quantities are as follows:—

$$\mu AX = \sqrt{\frac{7{,}000}{.32 \times 3 \times 10^7}} = \sqrt{.000729} = \underline{.027}$$

$$\mu XB = \sqrt{\frac{7{,}000}{.4 \times 3 \times 10^7}} = \sqrt{.000583} = \underline{.02415}$$

$$\alpha AX = .027 \times 45 \times 57.3 = \underline{69.7 \text{ deg.}}$$

$$\alpha XB = .02415 \times 50 \times 57.3 = \underline{69.2 \text{ deg.}}$$

$$\frac{w}{\mu AX^2} = \frac{7.5}{.000729} = \underline{10{,}270 \text{ lb./in.}}$$

$$\frac{w}{\mu XB^2} = \frac{7.5}{.000583} = \underline{12{,}860 \text{ lb./in.}}$$

The diagram is shown in Fig. 12.

The lettering is the same as in Fig. 11, but in this case the moment of inertia *increases* as we pass through X.

CASE VI

Change of Moment in the Bay

This case may occur because of a change in the cross section of beam over a part of the spar which results in a shift of the neutral plane above or below the neutral plane of the remainder.

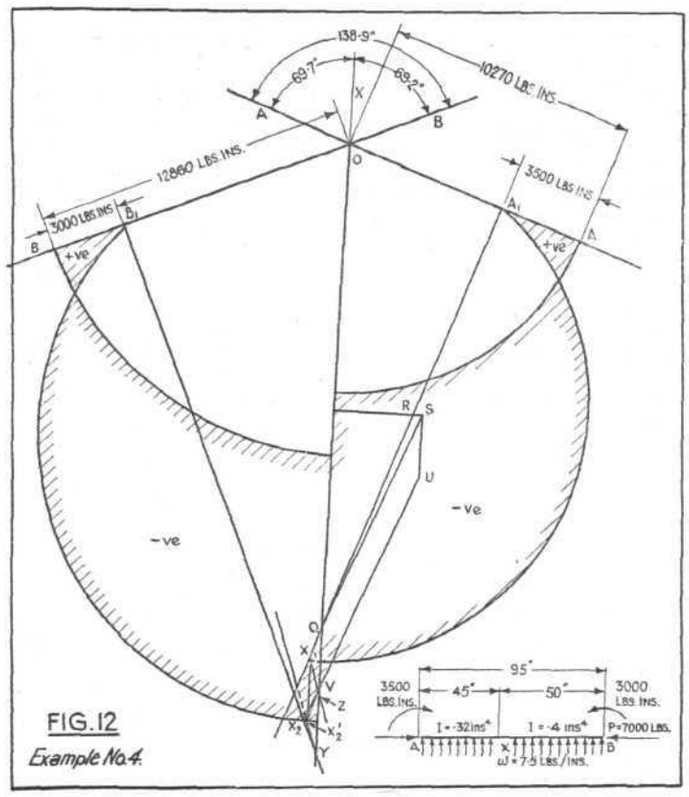


FIG. 12

Example No. 4.

It may also arise because of a load offset on its point of attachment to the beam.

As this interesting case is of rather infrequent occurrence the details of the construction will not be given here: they have already been described in the pages of *Flight*: the reader is referred for these particulars to *Flight* Aircraft Engineering Supplement, August 26, 1932, where he will find all details.

Having mastered the six cases already described he may now, in order to deal with any combination of the various types of loading, superimpose the constructions.

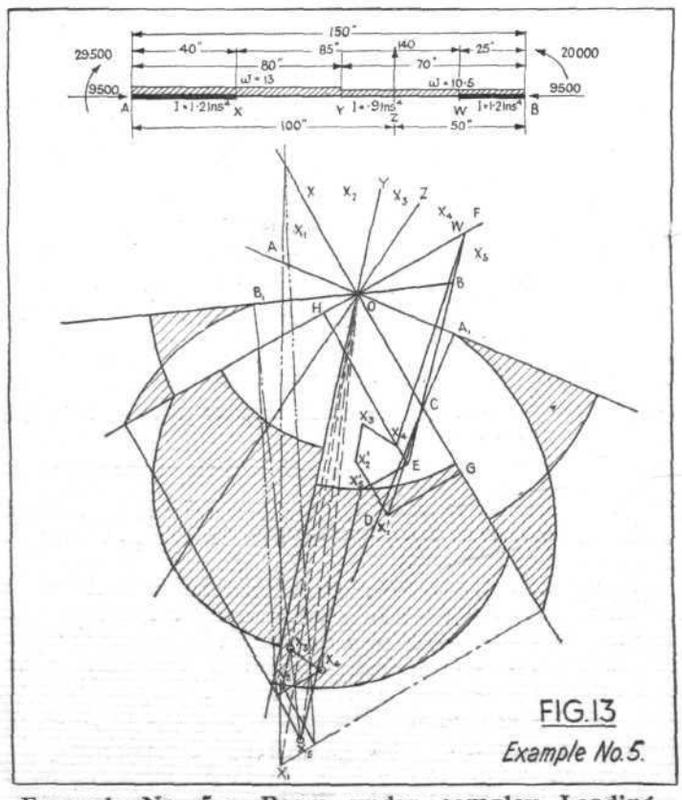


FIG. 13

Example No. 5.

Example No. 5: Beam under complex Loading Conditions.

This does not mean, however, that a change of end load in the bay can be dealt with graphically by the polar diagram. Such a change cannot be allowed for by pure graphics; if it is necessary to take account of it recourse must be had to a combination of analytical and graphical methods outside the scope of this article. When the end loads in the various parts of the beam do not differ greatly it is usually sufficient to use the mean end load throughout the bay.

It is, of course, evident that in no case is the method applicable to a *tensile* end load.

The angles α would, for negative values of P become imaginary, and therefore could not be drawn.

A sudden change in material along the span can be dealt with quite easily by exactly the same construction as for a change in moment of inertia. In fact all the observations which have been made, or will be made about the latter, apply equally to a change in the modulus of elasticity.

With the preceding proviso we proceed to an example.

Example (5)

A beam is subjected to the system of loading shown in Fig. 13. It will be noticed that there is a change in the moment of inertia 40 in. from the end A, and 25 in. from the end B. In addition there is a change in the distributed loading and a concentrated load.

It will be found convenient in this and all complicated cases to tabulate the necessary quantities as follows :—

	A	X	Y	Z	W	B
I in.^{4} ..	1.2	.9	.9	.9		1.2
P lb. ..	9,500	9,500	9,500	9,500		9,500
μ^2 ..	.000264	.000352	.000352	.000352		.000264
μ	.01625	.01875	.01875	.01875		.01625
W lb./in.	13	13	10.5	10.5		10.5
$\frac{w}{\mu^2}$ ..	49,250	36,950	29,850	29,850		39,800
α ..	37.25 deg.	43 deg.	21.5 deg.	26.85 deg.		23.3 deg.
$\frac{W}{\mu}$ ..				7,460		

The various vertices for the parts AX, XY, YZ, ZW and WB will be denoted by X_1, X_2, X_3, X_4 and X_5.

Having drawn all the radial dividing and bounding lines and arcs of radius $\frac{w}{\mu^2}$ the end moments may be set off. This gives the points A_1 and B_1.

On the normal to OA at A_1 any assumed vertex X_1 for AX taken, from which by the construction for change in moment of inertia, we arrive at the vertex X_2^1 for XY, X_3^1 is displaced from X_2^1 parallel to OY by an amount $\frac{w_{xy}}{\mu^2} - \frac{w_{yz}}{\mu^2}$ in the positive direction.

While X_4^1 is displaced from X_3^1 normal to OZ in the positive direction.

Having arrived at X_4^1 the construction for moment of inertia is again performed, and, by drawing a line through X_5^1 parallel to the final adjusted locus EF meeting the normal to OB at B_1 in X_5, we obtain the correct vertex X_5 for WB.

Starting now from OB with the correct X_5 the construction is repeated in the reverse direction, and the remaining correct vertices found.

A very interesting special case arises if a change of shear, due to a concentrated lateral load, occurs at the same place as the change in moment of inertia, or more generally the change in the quantity μ. It becomes, in this case, impossible to say from the general construction which is the correct value of μ to take at the discontinuity.

An obvious way of overcoming the difficulty, is to separate the two changes by a small distance along the spar.

If this is done, there will be no appreciable change in the diagram, and the ordinary methods previously described can be used. It is much better, however, not to introduce more different points of change than are necessary: a large number of changes calls for much more careful drawing and sometimes repeat diagrams to improve the accuracy of the first attempt.

Consider in particular the case in which a concentrated lateral load W occurs at X where the moment of inertia of the beam changes from I_1 to I_2 and, consequently, μ changes from μ_1 to μ_2. It is easily seen that a change in the magnitude of the distributed loading has no influence on the solution to the problem.

The difficulty is this: are we to use μ_1 or μ_2 in calculating $\frac{w}{\mu}$ for use in the construction at the point X?

Since the solution in the general case is unique, it is evident that there can be no ambiguity in the solution for this special case, because it is simply the limiting case arrived at by reducing the distance, originally finite, between W and the change in I until it is zero.

Assuming that I always changes at X there are two ways of looking at this apparent anomaly. The case may be assumed to be either the result of moving a concentrated load W initially a small distance to the *left* of X up to X_1 or, the result of moving a concentrated load W initially a small distance to the *right* of X back to X_1. Looking at the problem from this point of view, we infer that it is the sequence of the construction for the load W and the change in moment of inertia which decides the value of μ to be taken. If in our construction we are crossing a dividing line from a part A where $\mu = \mu_1$ to a part B where $\mu = \mu_2$ we should expect the following rule to hold.

If the construction for W is performed *first*, the value of μ for the part A should be used (viz., μ_1) to calculate the value of $\frac{w}{\mu}$: if the construction for W is performed after the construction for the change in moment of inertia, the value of μ for the part B should be used (viz., μ_2) to calculate the value of $\frac{w}{\mu}$.

These rules may be proved if the reader so desires by considering all the sequences which can be obtained by combining the different values of μ with the alternative sequences of the constructions.

It is then easily proved that the rule gives the only sequences compatible with a unique and consistent solution when the constructions have been performed from both ends of the beam as described above. It appears unnecessary to include a proof in the text of this article.

The descriptions will enable anyone to use the method for any single bay beam without an understanding of the principles underlying it.

Once the reader is conversant with the method he will gradually appreciate its mechanism and will realise that every construction has for its basis a known change in shear at each discontinuity in the bending moment diagram. In the case of a concentrated load W there is a change W in the shear: in all other cases there is *no* change in shear.

By stating whichever condition is applicable in any case the reader should have no difficulty in proving by simple geometry the construction given.

THE INSTITUTE OF METALS

This year's Annual Autumn Meeting of the Institute of Metals will be held in Manchester from September 3 to September 6. The thirteenth Autumn Lecture will be delivered by Dr. J. L. Haughton on September 3, the subject being "The Work of Walter Rosenhain." Of particular interest to aircraft engineers should be the paper on "The Influence of Pickling on the Fatigue Strength of Duralumin," by H. Sutton and W. J. Taylor. Those wishing to take part in the proceedings should communicate with the Secretary of the Institute of Metals, 36, Victoria Street, London, S.W.1.

TECHNICAL LITERATURE

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS

These Reports are published by His Majesty's Stationery Office, London, and may be purchased directly from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, W.C.2.; 120, George Street, Edinburgh; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square West, Belfast; or through any bookseller.

MODEL SPINNING TESTS OF AN INTERCEPTOR FIGHTER. By A. V. Stephens, B.A., and R. H. Francis, M.Sc. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1578. (17 pages and 2 diagrams.) May, 1933. Price 1s. net.

This Interceptor Fighter is a heavily loaded low-wing monoplane of R.A.F.34 wing section: A-B is negative and of considerable magnitude and the fin and rudder although unusually large are situated entirely above the tailplane. The fuselage is of approximately circular cross section. It has been shown theoretically that an aeroplane combining these qualities would be exceptionally liable to spin flat.

The aeroplane was spun at Martlesham with C.G. 10.5 in. behind the leading edge of the mainplane, and on the first occasion developed a flat spin to the right; the pilot, after attempting to recover by every artifice at his disposal, was finally compelled to abandon the aircraft. It appeared at first sight that, since the spin had been unquestionably flat and the controls correctly applied for recovery, the Interceptor Fighter was a clear case of a dangerous flat spinning aeroplane.

A 1/22 scale dynamical model of the aircraft was spun in the R.A.E. Free Spinning Tunnel, and the influence of the following factors investigated:—(*a*) elevator angle; (*b*) aileron angle; (*c*) C.G. position; (*d*) moments of inertia; (*e*) direction of spin. Recovery tests were carried out with several control movements, embracing as far as possible the various stages by which recovery from the flat spin at Martlesham was attempted.

The experiments show a close agreement between model and full scale and provide a plausible explanation of the flat spin at Martlesham, compatible with the satisfactory behaviour of the aeroplane in the earlier tests. It was found that the model spun steeply with elevators hard up and recovery on reversal of the controls was rapid; but if the elevators were moved downwards through as little as 10 deg. from this position a flat spin was induced from which recovery was sometimes very prolonged. Several variations of the original design were later tested and the experiments on them are described in Part II of this report.

A CONTINUOUS ROTATION BALANCE FOR THE MEASUREMENT OF YAWING AND ROLLING MOMENTS IN A COMPLETELY REPRESENTED SPIN. By P. H. Allwork, of the Aero-Dynamics Department, N.P.L. With an Appendix on the Experience Gained in the Use of the Apparatus. By H. B. Irving, B.Sc., and A. S. Batson, B.Sc., of the Aero-dynamics Department, N.P.L. R. & M. No. 1579. (6 pages and 2 diagrams.) November 2, 1933. Price 9d. net.

In R. & M. 828* and R. & M. 936† descriptions were given of two earlier continuous rotation balances in which the radius of spin was fixed at zero and incidence only was variable. The present balance was designed to obtain test conditions more nearly representative of a true spin, and by its means a complete aeroplane model can be tested at any presentation to the wind, within limits, and at any radius of spin up to 12 in., the maximum rate of spin being three revolutions per second. The model can be set at any presentation to the wind within limits

* A continuous rotation balance for the measurement of Lp at small rates of roll.—Relf and Lavender, R. & M. 828, August, 1922.

† A continuous rotation balance for the measurement of pitching and yawing moments due to angular velocity of roll.—Lavender, R. & M. 936, February, 1925.

COMPARATIVE TESTS WITH PETROL AND BUTANE ON AIR AND WATER COOLED AIRCRAFT ENGINES. By P. H. Stokes, B.Sc., and F. G. Code Holland, M.Sc., A.I.Mech.E. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1570. (66 pages and 28 diagrams.) July 14, 1933. Price 4s. net.

The experimental work, dealing respectively with an air-cooled and a water-cooled engine, was planned as part of a concerted effort towards an improvement in the fuel economy of engines in normal service. At the time when the work was started, the fuel consumptions per brake horse-power-hour commonly met with were substantially higher than the best obtainable upon a single cylinder test engine, and an element of uncertainty which it was often suggested must be held at least partly responsible was inequality of distribution of the fuel between the cylinders on a multi-cylinder engine. It was suggested that this might be the cause of a difference of some 15 per cent. between the highest thermal efficiency obtainable on a multi-cylinder engine and that reached under properly controlled conditions in a test engine.

It was decided to compare the fuel consumption per hour and the thermal efficiency of two typical engines, running on petrol in the normal way, with the results when the same two engines were run using a gaseous fuel, which could be thoroughly mixed with the air at its entry to the induction manifold. Under these conditions, although a perfectly uniform dispersion of the fuel within the cylinders could not be taken as certain, inequalities of fuel distribution as ordinarily understood would at any rate be completely eliminated. A good many preliminary trials were made using coal-gas as fuel, but the fundamental difference of chemical composition renders comparisons with petrol on a thermal efficiency basis uncertain, and butane (C_4H_{10}) was therefore decided upon as providing a gaseous fuel with molecules of the same general type as those of petrol.

The results achieved in the experimental work, if regarded from the point of view from which it started, are largely negative in character; for they appear to prove that losses through inequality of fuel distribution cannot be greater than about 5 per cent. and are therefore of secondary importanee.

Apart from this answer to a particular question, there is to be found in these reports a great deal of accurate data upon the efficiency-power relationship for aero-engines both supercharged and normally aspirated, and at altitudes up to 23,000 ft., more complete, perhaps than any hitherto published.

THE FRICTIONAL DRAG OF FLAT PLATES BELOW THE CRITICAL REYNOLDS NUMBER. By A. Fage, A.R.C.Sc. R. & M. No. 1580. (7 pages and 3 diagrams.) April 21, 1933. Price 6d. net.

Measurements of the frictional drag of flat plates have been made over the wide range of Reynolds Number. At the low values the measurements were made on two small plates of length 0.125 and 1 in. respectively, mounted in a small water tunnel, and at the high values on a 5 in. plate in a 1 ft. open-jet wind tunnel. The drag of each plate was predicted from changes of momentum in the fluid flowing along its surface. The velocity measurements needed for these predictions were obtained for the small plates by a technique involving the use of an ultra-microscope, and for the 5 in. plate by small pressure tubes.

An analysis of the results and those obtained by other experiments leads to the conclusion that over the wide range, the drag is given fairly closely by the Blasius relation. Over a lowest range the measured drag is higher than the Blasius value.

TESTS OF THE EFFECT OF FUEL EVAPORATION ON THE PERFORMANCE OF A CENTRIFUGAL SUPERCHARGER. By G. V. Brooke, B.Sc.Tech. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1574. (15 pages and 7 diagrams.) November, 1933. Price 1s. net.

The ratio of the absolute pressures at delivery and intake of a centrifugal air compressor operating under conditions of constant adiabatic efficiency is a function of the ratio of the square of the impeller speed to the absolute intake temperature. As the pressure ratio is known to increase with increase of impeller speed at constant intake temperature, the form of the function is necessarily such that an increase of pressure ratio with reduction of intake temperature at constant impeller speed would be expected. Complete confirmation of this effect when the fluid compressed was air was provided by the experiments described in R. & M. No. 1336.* Subsequent tests of a Kestrel II.S. engine (twelve cylinders, Vee construction, water-cooled) under artificial altitude conditions showed the existence of a similar effect when air and petrol mixture was passing through the supercharger, although decrease of intake temperature was found to produce slightly less than the anticipated increase of pressure ratio. In comparable tests of a "Jupiter VII" engine (nine radial cylinders, air-cooled) there appeared to be an entire absence of any influence of intake temperature upon supercharger pressure ratio. Tests were undertaken to ascertain whether these differences in the behaviour of the several superchargers could be attributed to the action of petrol evaporation upon the performance.

The investigation comprised three groups of experiments, in which the fluid compressed was (1) air, (2) a mixture of air with petrol to specification D.T.D.134, and (3) an air and white spirit mixture. The third series was included in order to examine the performance under conditions of greatly reduced evaporation without the necessity for tests at inlet temperatures sufficiently low to involve risk of freezing at the supercharger intake.

At initial air temperatures between 15 deg. and 20 deg. C. the performance when compressing air was only slightly affected by the admixture of white spirit. Under conditions of the maximum air temperature of 60 deg. C. at the carburetter intake, the admission of petrol produced an increase in the pressure ratio of the supercharger agreeing approximately with the estimated theoretical effect of complete vaporisation before entry to the impeller.

The magnitude of the increase of pressure ratio due to vaporisation became greater with increase of impeller rotation rate. At the highest speed reached in the tests (865 ft. per second at the impeller tip), the pressure ratio was increased almost 6 per cent. by the admission of petrol to the air at an intake temperature of 60 deg. C. This increase of pressure ratio represents a gain in rated altitude of approximately 1,500 ft.

* R. & M. 1336. The application of dimensional relationships to air compressors, with special reference to the variation of performance with inlet conditions. R. S. Capon and G. V. Brooke. (June, 1930.)

AMERICAN N.A.C.A. REPORTS

TECHNICAL NOTE NO. 491: TANK TESTS OF A FAMILY OF FLYING-BOAT HULLS. By James M. Shoemaker and John B. Parkinson.

This report presents towing tests made in the N.A.C.A. tank of a parent form and five variations of a flying-boat hull. The beams of two of the derived forms were made the same as that of the parent and the lengths changed by increasing and decreasing the spacing of stations. The lengths of two others of the derived forms were made the same as that of the parent while the beams were changed by increasing and decreasing the spacing of buttocks, all other widths being changed in proportion. The remaining derived form has the same length and beam as the parent, but the lines of the forebody were altered to give a planing bottom with no longitudinal curvature forward of the step.

The test data were analysed to determine the minimum resistance and the angle at which it occurs for all speeds and loads. The results of this analysis are given in the form of nondimensional curves for each model.

The effect of variation in overall size, as indicated by a "complete" test on any given hull, is pointed out. The effect of changing length alone by the spacing of stations, of changing beam alone by the spacing of buttocks, as well as the effects of the changes in length-beam ratio and longitudinal curvature that result from these operations are discussed.

TECHNICAL NOTE NO. 498: WIND-TUNNEL MEASUREMENTS OF AIR LOADS ON SPLIT FLAPS. By Carl J. Wenzinger.

Tests were made in the N.A.C.A. 7 by 10 foot wind tunnel, to determine the control forces and air loads acting on split flaps. Clark Y wing models were used with two different sizes of full-span split flaps; one having a medium chord (0.25 c), and the other a narrow chord (0.15 c). Hinge moments of the flaps were measured and also the division of load between the flaps and the wing.

The investigation showed that, at the angles of attack and flap deflections for maximum lift, the lift loads on the split flaps were only 5 per cent. and 9 per cent. of the total lift for the narrow and medium-chord flaps respectively. The ratio of drag on the flaps to total drag increased greatly with decreasing angle of attack, reaching a value of approximately unity at small negative angles of attack with the flaps fully deflected.

The normal force on the split flaps increases both with angle of attack and with flap deflection for angles of attack below the stall. The value of the normal-force coefficient is about 1.40 at the angle of attack and flap deflection for maximum lift with either of the flaps tested. The centre of pressure of the load on the split flaps in general moves forward with decreasing flap deflection and with increasing angle of attack from small negative angles up to the stall.

The hinge moments of the narrow-chord split flap were about 42 per cent. those of the medium-chord flap when deflected to give approximately the same maximum lift, but they are considered to be still too large for rapid and easy flap operation.

PRIVATE FLYING

A SECTION FOR OWNER-PILOTS AND CLUB MEMBERS

NOTES

by

LORD SEMPILL

A.F.C., F.R.Ae.S.

THOSE of us who have long been been protagonists of aircraft as a means of transport which could be adapted to the needs of the private person, whether for business or pleasure, are finding that the advantages of aviation are emphasised as time goes on. Neither private flying nor commercial air transport has long been considered to have an economic future in this country. The conservative mind could not see beyond the difficulties which confronted those who were desirous of developing internal air services. But the rapid expansion of air lines within Great Britain during the last two years has confounded the pessimists, and the experience of private owners is daily confirming the convenience of aviation to those who are fortunate enough to possess a modern light aeroplane.

As an example of the extreme usefulness of the aeroplane to the traveller whose business takes him or her to all parts of the country, I would cite an experience of my own within the last few days. Having two important engagements on two consecutive days in the Isle of Man and North Wales respectively, I was more than grateful for the fact that I was in a position to make such a journey by air. By the quickest form of surface transport available the actual travelling time involved in the round trip would have been at least thirty-two hours, and, of course, the overall time would actually have been much longer. In contrast, my flying time was *eight hours*.

Modern Reliability

THE ease with which such a journey may be made by air, involving as it does a sea crossing, is an indication of the reliability of present-day aircraft. The small air-cooled engines in general use are so dependable that there may be a tendency to treat the crossing of sixty or seventy miles of water with impunity. A word of warning might be given, however, in this respect, for although there is no doubt that such a flight may be embarked upon with every confidence, reliance can only rightly be placed on the power units now available if every care is taken to keep them in first-class order. Because the aeroplane has proved itself to be a vehicle of extreme reliability, there is no justification for assuming that it can be neglected in any single respect. The owner pilot who wishes to get the best out of his machine should pay particular attention to the necessity for using the correct grade of engine oil, which should be drained off and replenished at frequent intervals. Oil filters should be kept scrupulously clean, and the components of the petrol and ignition systems properly checked and adjusted. With proper care in these and other essential particulars the average aircraft engine of up-to-date design will function with safety and regularity in all conditions.

The service an engine will give if so looked after is remarkable, as the following will indicate. When, recently, I had my engine stripped and overhauled after covering some fifty thousand miles, it was found that so little wear had taken place that, apart from decarbonising, taking up of main bearings and reassembling, the cost of replacements did not amount to more than ten shillings. Of course, such results are only attained by taking care not to exceed, except for short periods and on necessary occasions, reasonable cruising r.p.m. So treated, the aircraft engine is normally subjected to less stress than the average car engine, for it would hardly be reasonable to anticipate that a car engine would function for such a distance without some major repair being necessitated.

While on this subject it may seem scarcely necessary to mention the importance of carefully warming up the engine before a flight—particularly one involving a water crossing. In this connection the advantage of using with the fuel, in the correct proportion, a good upper cylinder lubricant, is not, perhaps, so well recognised as it might be. The additional lubrication, by this means, of the top of the cylinder walls, which are apt to remain dry until the main oil supply is thoroughly warmed up, is very desirable, as it is during the process of running up from cold that a great deal of the wear takes place. If this habit is acquired during the warm weather the good effect will be more apparent in wintry conditions when it is even more necessary.

Apart from a conscientious attention to the upkeep of his machine the pilot who contemplates the making of sea crossings should not neglect to obtain a weather report of the route and of the vicinity of the proposed landing place, as conditions met with on one side of the water may be quite different from those on the other side—as I found when flying to the Isle of Man on this occasion. When leaving the mainland the weather was quite good, but I encountered a good deal of fog and low cloud in the neighbourhood of the Island.

In the Isle of Man

ALTHOUGH air services have been run to the Isle of Man from time to time, and Hillman's Airways, Ltd., who have recently taken over the operation of the route from Midland and Scottish Air Ferries, Ltd., have now made Castletown a port of call on their London-Belfast route, the ground facilities on the Island have not been very fully developed. The aerodrome at Ronaldsway (Castletown) is quite a good landing place and of ample size, but there is at present no hangar accommodation, and if it is required to leave a machine there for several nights it is necessary to arrange for local hands to erect a barbed wire fence round the aeroplane in order to keep off the cattle. In view of the interest taken for many years past by the Manx people in motoring matters, and of their encouragement of car and motor cycle racing, and remembering the facilities they have given for this purpose, it is rather surprising that better arrangements have not so far been made to cater for the needs of air transport, from which they have so much to gain. This is not due entirely to lack of interest, as His Excellency the Governor and the Manx authorities are alive to the value of aviation as a useful means of communication between the Island and the mainland. The difficulty has been to secure a suitable aerodrome site near to Douglas.

as the location of that at Castletown is not very convenient, being some eight or nine miles away from the capital town. There is, of course, a small landing place at Douglas, scheduled by the A.A., but this is only a one-way site and not suited for development for general purposes. The problem is one of some difficulty, due to the hilly nature of the country.

A Visit to North Wales

AFTER finishing my business in the Isle of Man I called at Criccieth in Carnarvonshire to keep a second appointment, and here I was fortunate in that I was able to use what is probably the only prepared private landing place in the north-west of Wales. I had previously ascertained the existence of this site and had received a very kind invitation from the owner, Lieut. W. Evans, of Broom Hall, Chwilog, who is an enthusiastic airman, to make use of this facility during my visit to Criccieth, from which town it is only ten minutes by car. Lt. Evans, who makes a good deal of use of his own machine, has laid out the field primarily for his own convenience. He has built a commodious hangar, and generally is to be congratulated on the possession of such well-organised facilities. The assistance he rendered me by way of preliminary directions, is worth mentioning as an object lesson of how things should be done.

He had taken the trouble to send me a tracing from a twenty-five-inch-to-the-mile ordnance map properly marked with the compass points and also indicating the nature of any obstructions within the boundary and in the vicinity of the aerodrome. The distances available for landing in all directions of the wind were also marked. Not content with this he had also provided me with a large scale coloured contour map of the County of Carnarvonshire with the site clearly shown. The completeness of these directions, of course, reflected Lt. Evans' own experience as a pilot and his knowledge of what is required to facilitate the finding of and safe alighting on an unfamiliar landing ground. I was not only glad of this help personally, but welcome the opportunity of passing on to my readers an example of a courteous and efficient way of facilitating the visit of a brother airman. Given prior notice, I am sure that Lt. Evans would be happy to extend a welcome to any private owner who wished to visit that part of Wales by air. Wales generally, and particularly the northern part, is very badly provided with suitable aerodrome sites, and those who intend to fly to the Principality are advised to make careful initial enquiries. The flying conditions are likely to be extremely difficult in many places, particularly when the hills are enveloped in low cloud.

FROM THE CLUBS

Events and Activity at the Clubs and Schools

HERTS AND ESSEX
During the past fortnight flying at Broxbourne has been hampered by bad weather, but in spite of this the total flying hours were 205 hr.: solo 123½ and dual 81½ hr. The Miles "Hawk" visited Belgium, and during the past week has been touring Great Britain A first solo was made by Mr. N. Bower, "A" licence tests passed by Mr. J. Parsons, and "B" licence tests by Mr. W. J. Alington.

BENGAL
Despite the arrival of the monsoon there was considerable activity during the month of June at the Bengal Flying Club. The total flying time was 126 hr. 5 min., of which 51 hr. 55 min. was solo flying. Mr. C. C. Misselbrook made a first solo, and both Baron J. B. Von Maltzen and Mr. W. C. Robinson passed their "A" licence tests.

CARDIFF
On Monday, July 16, the R.A.F. made their first official visit to Wales, when No. 501 Auxiliary Squadron arrived at Cardiff and were received and entertained by the Lord Mayor.

While one of the machines has its C. of A. renewed, a D.H. "Tiger Moth" has been loaned to the club, and this has been in great demand.

HATFIELD
The flying time for last week at the London Aeroplane Club was 82 hr. 35 min., and Mr. Ian Tainsh made his first solo flight. Cups have been presented to the club by Messrs. Hicks, Sprosen, Matush, Mark Young, Jun., and Ross-Kirkman, to be competed for by members during the course of the year. These are for forced landings, aerobatics, cross-country flying, landings, and navigation, and keen competition is expected.

LANCASHIRE
A neat first solo was carried out by Mr. A. Sykes, well known in the north for his connection with National Benzole, and, oddly enough, Mr. N Sykes, who is no relation, gained his "A" licence during the same period. Autogiros are figuring more and more in aerial activity at Woodford, and in connection with these there have been visits to the aerodrome by Señor de la Cierva, Air Com. J G. Weir, and Mr. R. A. C. Brie.

Intending visitors to the Lancashire Aero Club should note that the club will be entirely closed from July 30 to August 10 inclusive, but certain facilities will be available at the club branch at Barton.

HANWORTH
The period of managership of the Receiver for National Flying Services, Ltd. (Mr. C. J. G. Palmour) has been extended to October 27, 1934.

CAMBRIDGE
Flying times for the week were 23 hr. 15 min. dual, and 18 hr. 15 min solo at Marshall's Flying School, including a first solo by Mr. J. S. Paget. Navigation flights were made to Bristol, Rochford, Abridge, and Powebourne. Mrs. Beatty chartered the "Puss Moth" to Sandown for the races, and Wing Com. Waller flew two passengers to Heston.

MASONIC
Last Saturday the Masonic County and Flying Club-house was officially opened by W. Bro. A. G. Pears after being introduced by the Master of the Ceremonies, who gave a brief outline of the objects of the club. Afterwards there were competitions and amusements, followed by a visit to Brooklands Aerodrome, where Capt. Duncan Davis gave instruction to "flying member number one."

CINQUE PORTS
The club put in more than fifty hours' flying at Lympne last week. Two new members, Messrs. Pryor and Thres, had only five days in which to obtain their "A" licences, and they may yet have managed it.

During the week-end of the International meeting at Lympne on September 1 and 2 both the Folkestone Aero Trophy Race and the Cinque Ports Wakefield Cup Race will be held. The course that has been chosen is three circuits of sixteen miles each, in full view of the aerodrome. This year the latter race is being restricted to "A" licence, or non-commercial pilots, while the former is an open race. Entry fees for each will again be £2 2s.

RANGOON
The addition of a second machine early in June was of considerable help to the Rangoon Flying School, at which there was an increase of 6 hr. 30 min. flying during last month. Owing to the fact that several pupils have entered the solo category, the amount of solo flying was almost as great as that of dual. Six new pupils have joined the school, and three *ab initio* pupils have qualified for their Indian "A" licence.

Two aircraft have been repaired in the workshops. A school machine sustained slight damage in an accident to a pupil on his first solo, but was flying again on the following day, and Mr. C. W. Scott's Gipsy I "Moth" was repainted and rerigged.

AIR RACING AT PORTSMOUTH

Varied Entry and Some Fast Machines Compete for Trophies

THE FAST MACHINES: The last three entrants in the races were considerably faster than the rest of the machines. Here we see Capt. Dancy (with the flag) and Mr. Rowarth starting Mr. Cook in his Gipsy "Major" engined Comper "Swift." (*Flight* Photo.)

PORTSMOUTH Airport is a very busy one indeed, and, being the terminal for several commercial air lines, it was not so surprising that the races held last Saturday had not been more widely advertised, nor that there was not a greater crowd to watch them. There were two races on Saturday. The first lay over a course which took competitors twice round the Isle of Wight, and then once round a short course along under Portsdown Hill to Hayling Island and back to the aerodrome, so that for well over an hour those on the aerodrome saw very little of the machines at all. The second race, in which most of the machines which had already raced took part, was three laps of the short course, but owing to the fact that so many commercial machines were coming and going the whole time, it was not possible to have a turning point on the aerodrome itself. The spectators had to be content with watching the machines as they overtook each other between the aerodrome and Portsdown Hill. In the first race Flt. Lt. R. P. P. Pope, the chief flying instructor of the Air Service Training School, Hamble, flying a Comper "Swift" (Pobjoy R) came in first and so won the Duckham Trophy for the first "B" licence pilot home. Major F. S. Cotton, on an Avro "Avian" (7 cyl. Genet Major), being second and an "A" licence pilot, secured the Peters Trophy. The entry was very varied and ranged from "Moths" ("Gipsy I") to the "Mew Gull," so the start alone took over 38 minutes. The fast machines, particularly the "Mew Gull," appeared to lose a considerable amount of speed on the corners, as their average was lower than expected. This point was brought out even more forcibly in the second race over the short course with its many turns. The finish of both races was unfortunately devoid of thrills, except for one moment when Mr. D. Kinnear, flying a "Moth" belonging to the London Transport Sports Association Flying Club, touched his wheels on the aerodrome as he flew over the line. He managed, however, to save any accident by keeping his tail down. Flt. Lt. Luxmoore's win in the second race was naturally a very popular one, as he and Mr. L. M. J. Balfour, who was also flying, are responsible for founding the Portsmouth, Southsea and Isle of Wight Aviation Co., which operates Portsmouth aerodrome. The trophy was therefore kept at home. During the afternoon the Airspeed "Envoy" (two Wolseley A.R. IX engines) was flown in the course of testing, and not only were its remarkably fine lines shown to good advantage, but the silence of the Wolseley engines was also made evident. It is understood that an air line company operating between London and the north will be using a fleet of these machines before very long. An interesting visitor was a Saro "Cloud" (two "Whirlwind") which came over from Jersey in one-and-a-half hours, with Mr. J. C. Ballardie and Mr. John Lord, directors of Saunders Roe, Ltd. The complete results are given on the following page.

WINNERS: On the left, Flt. Lt. R. P. P. Pope, who won the round the Isle of Wight race; on the right, Flt. Lt. F. L. Luxmoore, Director of P.S. & I.W.A., who won the Portsmouth Trophy. (*Flight* Photo.)

The London-Newcastle Race

The closing date for the entries of the London to Newcastle Race, organised by the Newcastle Aero Club, has been extended to August 2, and late entries may be received up to August 6.

A Gliding Club for Poole

At a public meeting the formation of a gliding club for Poole was decided upon. The entrance fee will be as low as £1, and the practice ground will be on the slopes of Studland. The club has purchased Mr. R. Potgerter's glider, and he will be hon. instructor. Councillor W. T. Strickland has been appointed president, and Mr. F. B. McGarry hon. secretary.

THE PORTSMOUTH RACE RESULTS

Aircraft Registration	Aircraft and Engine	Entrant	Pilot	Round the Isle of Wight Race				Portsmouth Trophy Race			
				Start	Finish	Speed	Place	Start	Finish	Speed	Place
				min. sec.	min. sec.	m.p.h.		min. sec.	min. sec.	m.p.h.	
G-AAKN	Moth (Gipsy I)	Flt. Lt. F. Luxmoore ...	Entrant ...	0 00	77 51	101½	6	0 00	20 42	101½	1
G-AAZR	Moth (Gipsy I)	L.T.S.A. Flg. C.*... ...	D. Kinnear...	1 31	77 36	104	5	0 31	20 46	103¾	2
G-ACSA	Moth (Gipsy Major) ...	R. Holmwood	Entrant ...	6 05	77 25	111	4	—	—	—	—
G-ACTO	Hawk (Cirrus III)	Herts and Essex Ae. C. ...	R. Frogley ...	6 25	84 01	102	13	0 59	21 05	104½	4
G-ACMH	Hawk (Cirrus III)	Mrs. H. Barnes	V. Buchan ...	6 25	84 15	101¾	14	—	—	—	—
G-ABKB	Avian (Genet 7-cyl.) ...	Flt. Lt. H. Jenkins ...	Entrant ...	11 52	79 27	117	11	2 56	21 04	116	3
G-ABME	Avian (Genet 7-cyl.) ...	F. Cotton	Entrant ...	12 58	77 10	123¼	2	3 44	21 06	121	5
G-ACLI	Hawk (Gipsy III)	S. Cliff	Entrant ...	13 30	78 13	122½	8	3 35	21 10	119¼	6
G-ABIY	Puss Moth (Gipsy III) ...	L. Balfour	Entrant ...	14 33	79 20	122	10	3 35	21 10	119¼	
G-ACML	Swift (Pobjoy R)	Flt. Lt. R. Pope	Entrant ...	14 48	76 58	127½	1	4 16	21 11	124½	7
G-ACOO	Leopard Moth (Gipsy Major)	F. Cameron	Entrant ...	19 19	77 15	136¾	3	5 22	21 12	132¾	8
G-ABWW	Swift (Gipsy Major) ...	A. Cook	Entrant ...	28 55	78 12	160½	7	7 40	21 30	152	10
G-ACTE	Hawk (Gipsy Six)	Sir Charles Rose	Entrant ...	33 40	79 11	174	9	8 44	21 14	168	9
G-ACNO	Mew Gull (Gipsy Six) ...	E. Percival	Entrant ...	38 49	80 40	189	12	9 45	21 36	177⅛	11

* London Transport (Central Omnibus) Sports Association Flying Club.

IN A NEW WORLD: The British Klemm "Eagle" (Gipsy "Major") flying above the clouds. (*Flight* Photo.)

The Way of an "Eagle"

SOME few years ago Major E. F. Stephen secured the selling rights of the famous Klemm aeroplane for this country, and then, later, made arrangements for its manufacture. Now, after various setbacks, his enterprise has been rewarded by the firm establishment of the British Klemm Aeroplane Co., Ltd., at Hanworth. With that pioneer, Mr. G. H. Handasyde, in charge of the works, and with Lord Willoughby de Broke, Major Musker, Mr. J. Musker, and Mr. C. Best on the Board of Directors with Major Stephen, it is not surprising that the company has adopted an enlightened policy. The Klemm "Eagle" has already been described in *Flight* of July 12.

Last Thursday we had the pleasure of a flight in this latest model. It carries three persons, the two passengers being side by side behind the pilot. It is essentially a Klemm, and therefore retains the low wing. A feature which, however, stamps it as modern and at the same time assists in raising the cruising speed is the retractable undercarriage. This folds upwards and outwards right into the under-surface of the wing, leaving the machine very "drag-free." The "Eagle" is quieter than many other machines of the same general specification, and despite the high top speed does not land any faster than is usual—that is to say, it touches down at between 40 and 45 m.p.h. There is ample room in the cockpit, and the windows have been well arranged to give both passengers and pilot as wide and as unrestricted an outlook as possible.

The S.B.A.C. Challenge Trophy

NEXT Saturday the Society of British Aircraft Constructors' Challenge Trophy Race will be flown at Bristol. There will be two heats and a final, the first being flown at 12 noon and 12.30 p.m., and the second at 3 p.m. There will be three laps of a circuit between Bristol Airport, Marksbury, Somerdale, and Bristol, the distance being approximately 45 miles. The list of entries is as follows:—

Entrant	Pilot	Machine	Engine	Registration
Laurence Lipton...	Laurence Lipton	D.H. Mk. III Moth.	Gipsy III...	G-ABVW
Bristol and Wessex Aeroplane Club.	The Hon. H. C. H. Bathurst.	D.H. Major Moth.	Gipsy Major	G-ACPT
C. O. Powis ...	C. O. Powis ...	Miles Hawk...	Gipsy Major	—
A. H. Cook ...	A. H. Cook ...	Comper Swift	Gipsy Major Special.	G-ABWW
Lancashire Aero Club.	R. F. Hall ...	Avro Cadet...	Genet Major	G-ACMG
A. Henshaw ...	A. Henshaw ...	D.H. Leopard Moth.	Gipsy Major	G-ACLO
Leicestershire Aero Club.	D. D. Longmore	D.H. Gipsy II Moth.	Gipsy II ...	G-ABTF
London Aeroplane Club.	Flt. Lt. W. E. P. Johnson.	D.H. Gipsy II Moth.	Gipsy II ...	G-AASL
Sir Charles Rose...	Sir Charles Rose	Miles Hawk...	Gipsy Six .	G-ACTE
Miss E. D. Tyzack	Miss E. D. Tyzack	Avro Club Cadet.	Genet Major	G-ACHW

THE ENGLAND—AUSTRALIA RACE

The List of Entries for the Great October Event is now complete

THERE are several interesting points among the notices that have been issued by the Royal Aero Club to competitors in the MacRobertson race. Each machine, for instance, must bear a certificate, from its country of registration, showing that it conforms substantially to the minimum airworthiness requirements of the I.C.A.N. normal category. Competitors' fuel and oil will be checked after refuelling at each control point, so that some means of checking should be provided by all the entrants.

Numbers must be displayed on each side and on the undersurface of the fuselage. The time limit for protests has been extended to eight days, and these must be made in accordance with F.A.I. regulations.

The question of the inclusion of any wireless set in the payload of a machine entered for the handicap race is at present being considered.

Some notes on the preparations at Allahabad and on a survey of the route will be found on page 778.

Racing No.	Nationality	Nominator	Machine and Engine	Pilots	Races
1	(G.)	WOLF HIRTH	Messerschmitt BFW, HM 8A	WOLF HIRTH and HERMANN ILLG	H.
2	(N.Z.)	MANAWATU AERO CLUB	Miles Hawk, Gipsy III	Major COWPER	H.
3	(G.B.)	Lord NUFFIELD	Airspeed "Envoy" A.S.6, Wolseley A.R. 9	G. E. LOWDELL	H.
4	(U.S.A.)	HAROLD GATTY	Douglas Transport DC, Curtiss Wright "Cyclone."	J. FRYE and H. HULL	S. & H.
5	(U.S.A.)	Col. ROSCOE TURNER	Boeing Transport, Pratt & Whitney "Wasp"	Col. ROSCOE TURNER	S.
6	(H.)	DUTCH SYNDICATE	Pander S 4, Wright "Whirlwind"	D. L. ASTES and G. J. GEYSENDORFER	S.
7	(D.)	Lieut. M. HANSEN	Desoutter Mark II, Gipsy III	Lieut. M. HANSEN	H.
8	(H.)	K. L. M.	Fokker F. XXXVI, Wright "Cyclone"	I. W. SMIRNOFF or G. M. H. FRIJNS	H.
9	(U.S.A.)	KEITH RIDER	Keith Rider R-3, Pratt & Whitney "Wasp" Jr.	J. E. GRANGER	S. & H.
10	(F.)	MICHEL DETROYAT	Lockheed "Orion," Hispano-Suiza	M. DETROYAT	S. & H.
11	(U.S.A.)	WALTER T. VARNEY	Lockheed, Pratt & Whitney "Wasp"	Captain F. ROSE	S. & H.
12	(F.)	Vicomte JACQUES DE SIBOUR	René Couzinet, Hispano-Suiza	J. DE SIBOUR	S.
13	(F.)	Captain EDOUARD CORNIGLION-MOLINIER	Wibault Penhoët, Hispano-Suiza	Capt. E. CORNIGLION-MOLINIER and Capt. L. CHALLE.	S. & H.
14	(G.B.)	AIRCRAFT EXCHANGE & MART, LTD.	Airspeed Courier A.S. 5, Cheetah V	A. L. T. NAISH	H.
15	(G.B.)	F/O. C. G. DAVIES	Fairey IIIF, Napier "Lion"	F/O. C. G. DAVIES	S. & H.
16	(A.)	Mrs. MELROSE	D.H. Moth, Gipsy	C. J. MELROSE	H.
17	(F.)	ANDRE GUEIT	Caudron Monoplane, Renault	ANDRE GUEIT	H.
18	(F.)	M. FRETON	Potez 39, Lorraine Pétrel	M. FRETON and D'ESTAILLEUR CHANTERAINE	S. & H.
19	(G.B.)	BERNARD RUBIN	D.H. Comet, Gipsy Six	BERNARD RUBIN	S. & H.
20	(U.S.A.)	WILEY POST	Lockheed "Vega," Pratt & Whitney "Wasp"	WILEY POST	S.
21	(U.S.A.)	SALVADOR FARRE	Percival Gull, Napier Javelin	SALVADOR FARRE	H.
22	(S.)	Lieut. M. LINDHOLM	Northrop "Delta," Pratt & Whitney "Hornet."	M. LINDHOLM and G. LINDOW	S. & H.
23	(H.)	K. L. M.	Fokker XXII, Pratt & Whitney "Wasp"	I. W. SMIRNOFF or G. M. H. FRIJNS	H.
24	(G.B.)	WILLIAM COURTENAY	D.H. Moth, Gipsy I	W. COURTENAY	H.
25	(U.S.A.)	WEDELL-WILLIAMS AIR SERVICE CORP.	Wedell-Williams 303, Pratt & Whitney "Wasp."	——	S.
26	(G.B.)	Sir ALAN J. COBHAM	Airspeed Courier A.S. 5A, Cheetah V	Sqd. Ldr. D. F. STODART	H.
27	(Ind.)	V. L. CHANDI	D.H. Fox Moth, Gipsy Major	A. M. MORAD	H.
28	(A.)	Sir CHARLES KINGSFORD-SMITH	Lockheed Altair, Pratt & Whitney S.I.D.I.	Sir CHARLES KINGSFORD-SMITH and P. G. TAYLOR.	S. & H.
29	(G.B.)	HOSPITALS TRUST, LTD.	Bellanca Monoplane, Pratt & Whitney "Wasp" Jr.	Col. J. C. FITZMAURICE	S. & H.
30	(U.S.A.)	Miss JACQUELINE COCHRAN	2 P.L.C.M. Northrop Monoplane, Wright "Conqueror."	Miss J. COCHRAN and WESLEY SMITH	S. & H
31	(G.B.)	H. L. BROOK	Miles "Falcon," Gipsy Major	H. L. BROOK	H.
32	(U.S.A.)	LYON FLIGHT EXPEDITION CO., INC.	Lockheed "Orion," Pratt & Whitney "Wasp."	R. F. LAPE and H. LYON	S. & H.
33	(U.S.A.)	JOHN H. WRIGHT	Lambert-Monocoupe, Warner Super-Scarab	JOHN H. WRIGHT	H.
34	(G.B.)	A. O. EDWARDS	D.H. Comet, Gipsy Six	C. W. A. SCOTT and T. CAMPBELL BLACK	S. & H.
35	(N.G.)	NEW GUINEA CENTENARY FLIGHT SYNDICATE	Fairey Fox, Fairey Felix D 12	R. PARER and G. E. HEMSWORTH	S. & H.
36	(A.)	H. C. MILLER	Lockheed "Vega," Pratt & Whitney S.C.	H. C. MILLER and J. WOODS	S. & H.
37	(U.S.A.)	DAVID WEHMAN and PAUL W. CLOUGH	Cessna AW, Warner Scarab	PAUL CLOUGH	H.
38	(N.Z.)	R. C. WALLACE	Short "Scion," Pobjoy Niagara	S. S. KIRSTEN	H.
39	(F.)	ANDRE DE ROUSSY DE SALES and JEAN LACOMBE.	Bernard Monoplane 84, Mistral Major	A. DE ROUSSY DE SALES and J. LACOMBE	S. & H
40	(P.)	C. CUDELL GOETZ	Comper "Kite," Pobjoy Niagara	C. C. GOETZ	H.
41	(G.B.)	W. J. CEARNS	D.H. Moth Major, Gipsy Major	S. JACKSON	H.
42	(H.)	K. L. M.	Fokker XVIII, Pratt & Whitney "Wasp"	I. W. SMIRNOFF or G. M. H. FRIJNS	H.
43	(A.)	AIR RACE AUSTRALIAN ENTRY, LTD.	Air Race Australian Entry, Ltd., Monoplane, Harkness & Hillier.	D. SAVILLE	S. & H.
44	(H.)	K. L. M.	Douglas DC 2, Wright "Cyclone"	K. D. PARMENTIER and J. J. MOLL	S. & H.
45	(U.S.A.)	MURRAY B. DILLEY, Junr.	Vance "Viking," Pratt & Whitney "Wasp"	MURRAY B. DILLEY, Junr.	H.
46	(U.S.A.)	CLYDE E. PANGBORN	Granville Monoplane, Pratt & Whitney "Hornet."	CLYDE PANGBORN	S.
47	(G.B.)	Flt. Lt. G. SHAW	British Klemm "Eagle," Gipsy Major	Flt. Lt. G. SHAW	H.
48	(U.S.A.)	RUSSELL A. HOSLER	Hosler B., Curtiss Wright D 12	RUSSELL A. HOSLER	S. & H.
49	(U.S.A.)	Miss RUTH R. NICHOLS	Lockheed Altair, Pratt & Whitney "Wasp"	Miss RUTH R. NICHOLS	H.
50	(U.S.A.)	NEW YORK, LONDON, MOSCOW, AIR LINES, INCORPORATED.	Vultee 5-1 A, Wright "Cyclone"	Lt. Col. G. R. HUTCHINSON	S.
51	(I.)	SOCIETA IDROVOLANTI ALTA ITALIA "SAVOIA."	Savoia-Marchetti S. 79, Piaggio "Stella"	ADRIANO BACULA and ALESSANDRO PASSALEVA.	S. & H.
52	(G.B.)	R. K. DUNDAS, LTD.	Airspeed Courier A.S. 5A, Cheetah V	Mrs. KEITH MILLER	H.
53	(U.S.A.)	Miss LAURA INGALLS	Lockheed "Orion," Pratt & Whitney "Wasp"	Miss L. INGALLS	S.
54	(F.)	BLERIOT AERONAUTIQUE SOCIETE ANONYME	Blériot III, Gnôme et Rhône	CHARLES QUATREMARE	S. & H.
55	(N.Z.)	Messrs. WAUGH and EVERSON	Waugh and Everson Monoplane, Cherub III	— EVERSON	H.
56	(G.B.)	Lady COBHAM	Airspeed "Envoy" A.S. 6, Wolseley A.R. 9	Flt. Lt. H. C. JOHNSON and Flt. Lt. G. A. V. TYSON.	H.
57	(U.S.A.)	Mrs. LOUISE THADEN	Beech A. 17 F., Wright "Cyclone"	Mrs. L. THADEN and Major HERBERT V. THADEN.	S.
58	(G.B.)	Captain T. NEVILLE STACK	Airspeed A.S. 8, Cheetah VI	Capt. T. NEVILLE STACK and S. L. TURNER	S. & H.
59	(G.B.)	ALAN S. BUTLER	D.H. Dragon, Gipsy Major	——	H.
60	(N.Z.)	OLIVER NICHOLSON, PRESIDENT & MEMBERS OF NEW ZEALAND CENTENARY AIR RACE COMMITTEE.	D.H. Dragon, Gipsy Six	J. D. HEWETT and C. E. KAY	S. & H
61	(I.)	FRANCIS LOMBARDI	Cantieri Aeronautici Bergamaschi PL 3, Fiat A 59.	F. LOMBARDI and V. SUSTER	S. & H.
62	(G.B.)	J. K. C. BAINES	Fairey Fox, Felix Curtiss	F/O. H. D. GILMAN	S. & H.
63	(G.B.)	J. A. MOLLISON	D.H. Comet, Gipsy Six	J. A. and Mrs. MOLLISON	S. & H.
64	(A.)	H. W. G. PENNY	Cord Vultee, Wright Cyclone F2	H. W. G. PENNY	S. & H.

(A.) Australia. (D.) Denmark. (F.) France. (G.B.) Great Britain. (H.) Holland. (I.) Italy. (Ind.) India. (N.Z.) New Zealand. (P.) Portugal. (S.) Sweden.
S Entered for Speed Race. H. Entered for Handicap Race.

THE AIR EXERCISES

Practice Over London

FOR the last two years the annual exercises of the R.A.F. Command, Air Defence of Great Britain, have not been held in the neighbourhood of London for political reasons, and doubtless for the same reasons the Press during those last two years was not permitted to visit any of the active centres. This year the same political considerations do not apply, while at the same time London cannot be permanently excluded from the scope of the exercises. If ever it is necessary for A.D.G.B. to do its duty in another war, which we all hope will not happen, London would certainly be the main object of attack, and therefore of defence. The organisation of the defence would be all at sea unless it had been practised in peace over the terrain where it would have to function in war. The ground units are vital to the scheme. There could be no adequate defence without good work by the Observers' Corps, which consists of patriotic citizens enrolled as special constables, and by the searchlights, sound-locators, and guns of the Territorial Army. All these units are composed of local men, whose local knowledge is of great importance. They must be practised in peace on their own ground. It is not practicable, even if it were desirable, to move them to other parts of the country for the exercises. In fact, London can be described as a prepared battlefield for A.D.G.B., and every possible move of the game must be made familiar by practice on that field. Incidentally, no Territorial Royal Artillery are taking part in these exercises.

The scheme laid down is very simple. Northland is the country round London, bounded on the North by a line drawn through Liverpool and Lincoln, and on the West by a line through Liverpool and Portland. Its forces are the Fighting Area, supplemented by one squadron of reconnaissance aircraft, and all the ground units, under the command of AVM. P. B. Joubert de la Ferté, whose headquarters are at Uxbridge. Southland is a foreign country across the sea whose forces are the bomber squadrons of the Western and Central Areas. The ten squadrons of day bombers are under the command of Air Com. H. R. Nicholl, with headquarters at Abingdon, and the eight squadrons of night bombers are under AVM. P. H. L. Playfair with headquarters at Andover

From 9 a.m. to 6 p.m. (we beg pardon, from 09.00 hours to 18.00 hours) each day there is an armistice. Raiding by day bombers begins at the latter hour, during the night the night bombers carry on, and at dawn the day bombers take charge once more. Incidentally, the Air Ministry has expressed regret for the inconvenience and discomfort which may be caused by the noise of the engines, and particularly regrets that some sick persons may not be able to sleep through it; but as the practice is quite essential the authorities hope that the inconvenience will be accepted in a public-spirited manner.

The targets, at each of which there will be a camera obscura, and each of which represents some object of military importance, are the Air Ministry, Imperial Chemical Works, West India Docks, Solvent Products, Ltd., Marble Arch, Kidbrooke, Wormwood Scrubbs, Whitley Abbey aerodrome at Coventry, Hornchurch aerodrome, North Weald aerodrome, and Northolt aerodrome.

No casualties are being estimated. Bombers are permitted to make use of clouds, and fighters may climb or dive through clouds, but must not operate when in them. Bombers are to attack at over 10,000ft. when possible, except when making diving attacks. All night bombers must pass through the lighted area. Fighters must keep navigation lights on at night, and bombers also, except when approaching from the coast and passing through the lighted area, and if not lighted they must switch on lights if another aircraft approaches. Fighters and bombers must not approach within 100 yards of each other. Fighters by day make only one attack on a formation, and by night fire a green light to show that an attack has been made. No attacks by fighters are to be made within three miles of an objective.

The forces engaged are:—

NORTHLAND

Unit	Aircraft	Station
41 Fighter Squadron	"Bulldog"	Peterborough
19 Fighter Squadron	"Bulldog"	Duxford
111 Fighter Squadron	"Bulldog"	Duxford
29 Fighter Squadron	"Bulldog"	North Weald
43 Fighter Squadron	"Fury"	North Weald
56 Fighter Squadron	"Bulldog"	North Weald
25 Fighter Squadron	"Fury"	Hornchurch
54 Fighter Squadron	"Bulldog"	Hornchurch
1 Fighter Squadron 2 Flights	"Fury"	Biggin Hill
23 Fighter Squadron	"Demon"	Biggin Hill
32 Fighter Squadron	"Bulldog"	Biggin Hill
3 Fighter Squadron	"Bulldog"	Kenley
17 Fighter Squadron	"Bulldog"	Kenley
604 Fighter Squadron	"Wapiti"	Tangmere

RECONNAISSANCE AIRCRAFT

13 Army Co-operation Squadron	"Audax"	Eastchurch

GROUND UNITS

26th A.A. Searchlight Battn., R.E. (T) (as directed by A.O.C., Northland).

Essex Group A.A. Sound-locator Coys., R.E. (T) (as directed by A.O.C., Northland).

Kent and Middlesex Group A.A.S/L. Coys. R.E. (T) (as directed by A.O.C., Northland).

27th A.A. Searchlight Battn., R.E. (T) (as directed by A.O.C., Northland).

Surrey Group A.A.S/L. Coys. R.E. (T) (as directed by A.O.C., Northland).

307th A.A. S/L. Coy. (Tyne E.E.) (T) (as directed by A.O.C., Northland).

1st A.A. Searchlight Battn., R.E. (as directed by A.O.C., Northland).

It is felt that as the A.A. guns cannot fire, there is no use in having them out.

It may be noted that the "Wapitis" of No. 604 (County of Middlesex) Squadron are reckoned as fighters.

SOUTHLAND

DAY BOMBERS

Unit	Aircraft	Station
101 Bomber Squadron	"Sidestrand"	Cranwell
12 Bomber Squadron	"Hart"	Cranwell
35 Bomber Squadron	"Gordon"	Bircham Newton
40 Bomber Squadron	"Gordon"	Bircham Newton
207 Bomber Squadron	"Gordon"	Bircham Newton
18 Bomber Squadron	"Hart"	Upper Heyford
57 Bomber Squadron	"Hart"	Upper Heyford
501 Bomber Squadron	"Wallace"	Manston
33 Bomber Squadron	"Hart"	Hawkinge
504 Bomber Squadron	"Wallace"	Hawkinge

NIGHT BOMBERS

99 Bomber Squadron	"Heyford"	Upper Heyford
9 Bomber Squadron	"Virginia"	Boscombe Down
10 Bomber Squadron	"Virginia"	Boscombe Down
7 Bomber Squadron	"Virginia"	Worthy Down
58 Bomber Squadron	"Virginia"	Worthy Down
500 Bomber Squadron	"Virginia"	Manston
502 Bomber Squadron	"Virginia"	Manston
503 Bomber Squadron	"Virginia"	Manston

IN NORTHLAND

Observations and Impressions gathered on a Tour of some of the Stations during the first Day of the Air Exercises.

By Major F. A. de V. ROBERTSON, V.D.

Monday, July 23.

THE sham war started at 18 hours to-night, but before that I had made a tour of some of the stations of Northland. From these visits I was able to gather some of the special points concerning the present exercises. From the list of stations at which the fighter squadrons are stationed it will be seen that only two of them are stationed near the Northland frontier, No. 41 (Fighter) Squadron at Peterborough, and No. 604 Squadron at Tangmere. The three interceptor squadrons are all in what is sometimes described as the inner ring of aerodromes, two flights of No. 1 F.S. being at Biggin Hill, No. 25 F.S. at Hornchurch, and No. 43 F.S. at North Weald. One of the objects of the defence in these exercises is to test the possibility of making interceptions as the bombers come in from the coast, though naturally attacks are also made on them as they go out. This effort to intercept before the raiders reach their targets calls for depth of defence. The fighters must be as far back as possible inside the circles of the observers and the territorial guns and searchlights. Then, on the receipt of a raid warning, the fighters, after taking off, will move forward to meet the raids, the interceptors first where possible, while the day-and-night fighters, being slower, will form a second line of defence behind the interceptors. Squadrons stationed near the frontier cannot get a warning until the bombers have flown over their heads, and would have to indulge in a stern chase Londonwards with little hope of catching the bombers before they reached their objective. In these exercises the chance of catching them would be minimised by the rule which forbids fighters to make an attack within three miles of a target. As for the chances of catching the raiders on the way out, it is reckoned that it would not be much use in ordering up special squadrons for that purpose, but there are sure to be squadrons already in the air which have either hit or missed an incoming raid, and these can be used to catch bombers on their way home.

The impression was gained that for defence by day long endurance is not of much importance to a fighter Climb and speed are the two requisites. It is impossible to adopt the tactics of keeping patrols continuously in the air, and so the system has been adopted of waiting for news from the observers and from the territorials, and ordering up squadrons across the path of each raid. It is a matter of splitting seconds, as the modern day bomber can get from the coast to London in about 20 minutes. Consequently everything depends on the promptitude of the information, the high training of the fighter squadrons, and the climb and speed of the machines.

Searchlights

It was at Uxbridge that the ideas of the defence scheme were to be studied. At Kenley it was possible to learn more details about the ground defences. The list of ground troops employed is published in another column. It will be noticed that one battalion of regular R.E. searchlights is taking part in the Exercises. It is perhaps not generally realised that in war the searchlights of the regular Army would not be available for Air Defence of Great Britain. They would be needed for Army work, and the Army might be overseas. The ground troops which do such vital work for A.D.G.B. are all Territorials, and for these Exercises the regulars are only on loan. There are 104 searchlights of the Territorial Army stationed round London, and the regulars are supplying forty-two lights in and around Lincolnshire. In searchlights, sound-locators, A.A. guns, and other equipment, the regulars have the latest patterns, while those supplied to the Territorials by the War Office are of an older vintage. That is in accordance with the principle which once obtained, that the Territorials are only a second line, and therefore do not need the latest and most expensive equipment. That principle may have been sound enough when the Territorials were merely second line Army troops. But air defence has nothing to do with second lines. It is a primary matter, and if it broke down badly, the country might be crippled. For operations, the Territorial searchlights and other elements are an integral part of air defence, and A.D.G.B. cannot function to any effect without them. It is a maxim that without searchlights there can be no interception at night. The part played by the Territorials is vital, and it is little less than a scandal that their equipment should not be the best which the country can produce. Incidentally, the air defence Territorial units in the London district are about 1,500 men below strength. Here is a fine chance for patriotic young men, especially men with a mechanical turn of mind, to do good work for their country, and at the same time to take up an extremely interesting occupation. Everyone can picture for himself the joy it would be to direct his searchlight on to a bomber, and tear the veil of secrecy from the would-be hider in the darkness.

The Offensive

Northland was not the place to gain actual information about the offensive by the two Areas which control the day bombers and the night bombers. Still, the plans of A.D.G.B. are harmonious, and the offensive and the defensive sections are correlated. The bomber squadrons of A.D.G.B. do not exist to slaughter the women and children of the enemy, but to cripple that enemy's power of attacking us. They are intended to attack his aerodromes and aircraft factories, and if possible force him on to the defensive. An enemy heavily assailed by our bombers may even be forced to convert his own day bombers into defensive fighters. In our own case the "Hart" would make a very good defensive fighter if the need should arise, and we must credit the enemy with having a similar type of aircraft. Such action by our bombers should greatly relieve the strain on our Fighting Area, and minimise the danger to London and other cities.

Anti-Aircraft Guns

In considering defence by day, one must not overlook the part to be played by the guns. The Territorial Royal Artillery allotted for air defence are not taking part in these Exercises, because they cannot fire shell, and mere aiming would be dull work for them. They get their practice with live shell at various camps during the year It is believed that aircraft will never be able to fly higher than the guns can reach There was a time during the War when Sopwith "Pups" congratulated themselves that they were out of the reach of "Archie.' Aircraft will never again have that comfortable feeling. It is also reckoned that if aircraft were to fly steadily on their course, some of them would fall victims to the guns. Therefore the guns may divert them from their course, or at least make them alter their height, either of which hampers the attack to some extent. If the guns break up the bombers' formation, that gives the fighters a much better chance of inflicting casualties Even if none of these things happen, still the guns are useful for pointing out the raiders to the searching fighters, for it is easier to spot aircraft from the ground than from the air.

By night the whole problem is different, and different tactics are used on both sides. There can be no formation flying, and the night bombers come in singly, usually in a stream, one after another. The defence now maintains a continuous patrol by fighters, each fighter flying singly over given areas and at given heights. Everything then depends on the sound-locators and searchlights. Without lights, the fighter has next to no chance of making an interception Once three beams concentrate on a bomber, that bomber's fate should be sealed. Clouds are not always a protection to the bombers, for the latest sound-locators are extraordinarily accurate, and can keep the beams on the course of the bomber even when he is invisible from the ground. Cases have been known of pilots flying by night above thin layers of clouds and all the way they could see the light of the beams filtering through the clouds dead in their direction. When they at last emerged from the shelter of the cloud layer, they were immediately illuminated for the waiting "Bulldogs" to see. At night, therefore, air endurance becomes a matter of some importance to a fighter, while high speed and climb are of less consequence when the quarry is a night bomber. In the actual combat the fighter, attacking out of the darkness, has all the advantage, and the result should never be in doubt.

THE ROYAL AIR FORCE

R.A.F. STAFF COURSE, 1935

The dates of the terms of the R.A.F. Staff Course, 1935, are as follows:—First term, January 22 to April 5; second term, May 6 to August 2; third term, September 23 to December 20. Officers who are undergoing the course will join on the evening of January 21, 1935.

AERO ENGINE NOMENCLATURE

The Air Ministry have decided to alter the name of the Bristol aero engine known as "Mercury VI S.2." It will in future be known as "Mercury VI S."

OFFICIATING CLERGYMEN

It has been decided that, in future, officiating clergymen will be known as officiating chaplains. The new title is to be used in all correspondence and reports relating to officiating chaplains.

FORMATION OF No. 65 (FIGHTER) SQUADRON

No. 65 (Fighter) Squadron will form at Hornchurch on August 1, 1934, and will be armed with "Demons."

This is the second of the new squadrons provided for in the Air Estimates. The first is No. 142 (Bomber) Squadron, which is forming at Netheravon and is equipped with "Harts." It is satisfactory to see that the second new unit is to be a fighter squadron, and it is also satisfactory to note that it will be given the two-seater "Demon" with supercharged "Kestrel." We shall soon have three squadrons of "Demons," No. 23 F.S. at Biggin Hill, No. 41 F.S. at Northolt, and now No. 65 F.S. at Hornchurch. The principle of the two-seater fighter deserves exhaustive trial.

BERTRAND STEWART PRIZE ESSAY

The subject for the Bertrand Stewart Prize Essay (for particulars see *Army Quarterly*) for 1935 is as follows:—

"The predominant part played by the Army under Wellington in Spain and Belgium has tended to obscure the principle that governed its employment in the war of 1793-1815. The Army, in the opinion of the country, was first and foremost the auxiliary of the Fleet; and only when the naval strength of the enemy had been destroyed was it used in the ordinary manner, *i.e.*, in the invasion of the hostile territory and in lending aid to the forces of confederate powers. Events proved that these principles were absolutely sound.—(Henderson's 'Science of War,' page 28.)

"Discuss the soundness of these principles at the present day."

NIGHT FLYING WITHOUT NAVIGATION LIGHTS

Night flying without navigation lights will be carried out by R.A.F. aircraft within a radius of five miles of Gosport Aerodrome from July 31 to August 3 and August 7 to 10, 1934, inclusive, from 22.30 to 23.59 hours. The aircraft will not exhibit navigation lights while flying between 5,000ft. and 8,000ft. unless other aircraft are observed in the vicinity.

FLEET AIR ARM ALLOWANCES

A new Order in Council provides that lieutenants and lieutenant-commanders who have not undergone the staff course but are qualified fleet air arm pilots or observers should receive some additional remuneration when appointed for operational duties on the staff of a flag officer with aircraft under his command. An allowance of 2s. 6d. a day is approved for these officers, subject to certain conditions. It is not to be paid concurrently with navigating, specialist, or physical training allowance, or that payable to non-specialist officers performing specialist duties laid down in the Order in Council of January 22, 1920. Nor is it to be paid for any day on which an officer carries out a practice flight in respect of which he receives 6s. under the Order in Council of May 7, 1928.

R.A.F. BENEVOLENT FUND

A Council meeting was held at the offices of the Fund on July 11. Sir Charles McLeod, Bart, chairman and hon. treasurer, was in the chair. The usual financial resolutions were carried. The Council were informed that as a result of the valuable assistance amounting to £1,173 so generously contributed by the S.B.A.C. and the aircraft firms, the proceeds amounting to £2,555 12s. 4d. resulting from Empire Air Day so successfully launched by the Air League, a gift of £100 from the Grocers' Company, and £100 from King George's Fund for Sailors, in addition to substantial sums received from various Royal Air Force commands, stations and individuals, the Royal Air Force Benevolent Fund is in an appreciably stronger position than at this time last year. Grants amounting to £1,004 0s. 1d. had been expended since the last Council meeting, which represented a decrease over the same period last year. The number of cases dealt with so far this year total 1,152, representing a net increase of over 100 more than those recorded during the same period last year. As a result of the improved financial position and evidence of less distress the Council decided that the policy of restricted grants could now be ended and the former generous scale might be reverted to in deserving cases. It is most satisfactory to be able to

ON TEST: Two views of the new Short "Singapore III" flying boat (4 Rolls-Royce "Kestrels") which recently underwent trials at Rochester. Note the clean running during take-off. The pilot was Mr. Lankester Parker.
(*Flight* Photos.)

record the improved position of the Fund. As long, however, as the Fund is largely dependent upon uncertain sources of income there will always be the danger of a sudden shortage of money and a repetition of the inability to provide adequate relief as happened in the period 1933-34. The twofold aim of Council must continue to be that of generous assistance in deserving cases, and at the same time to build up capital to place the Fund on a secure foundation.

ROYAL AIR FORCE GAZETTE

London Gazette, July 17, 1934

General Duties Branch

Flt. Lt. E. H. Shattack, R.N., Flying Officer, R.A.F., ceases to be attached to the R.A.F. on return to Naval duty (June 12); Flt. Lt. A. J. Long takes rank and precedence as if his appointment as Flt. Lt. bore date April 1, 1919. Reduction takes effect from May 29; F/O. J. H. Manning-Fox is placed on the retired list at his own request (July 7).

The follg. Flight Lieutenants are transferred to the Reserve (July 15):—CLASS A.—A. G. Pickering, A.F.C. CLASS C.—C. H. Noble.

The follg. Flying Officers are transferred to the Reserve, Class A:—G. R. Stroud (July 9); F. J. B. Keast (July 16).

Stores Branch

Flt. Lt. A. E. F. McCreary is placed on the retired list (July 5).

Medical Branch

Flt. Lt. L. C. Palmer-Jones, M.B., Ch.B., F.R.C.S.(E), is promoted to the rank of Squadron Ldr. (July 18).

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

J. T. Hall is granted a commission as Flying Officer in Class A (April 19). Flt. Lt. D. S. Green is transferred from Class C to Class A (June 18).

The follg. officers are transferred from Class A to Class C:—Flt. Lt. A. D. Bennett (June 24); F/O. C. D. Barnard (July 17).

Pilot Officer on probation J. H. C. Beard is transferred from Class C to Class AA(ii) (June 17).

The follg. Flying Officers relinquish their commissions on completion of service:—R. S. Sikes (June 24); H. A. S. Byrne (July 7); P. E. Grenfell (July 18).

Medical Branch

Flt. Lt. E. P. Carroll, L.R.C.P.&S., relinquishes his commission on completion of service (June 1).

Special Reserve

General Duties Branch

Pilot Officer on probation A. J. Young is confirmed in rank (June 21).

AUXILIARY AIR FORCE

General Duties Branch

No. 602 (CITY OF GLASGOW) (BOMBER) SQUADRON.—J. M. Shewell is granted a commission as Pilot Officer (June 26).

TERRITORIAL ARMY

Anti-Aircraft Searchlight Companies

KENT AND MIDDX. GROUP.—Sec. Lt. J. E. S. Ricardo resigns his commn. (June 22).

Anti-Aircraft Searchlight Battalions

26th (LOND) AAS BN (LEE).—2nd Lts. to be Lts.; July 11, 1934: H. H. Carey, B.Sc., J. M. Peacock, G. F. St. Barbe, and J. P. Treen.

Anti-Aircraft Searchlight Companies

ESSEX GROUP.—2nd Lt. H. P. de Roeper, D.S.M., to be Lt.: July 11, 1934. KENT & MIDD'X GROUP.—E. A. S. Edwards to be 2nd Lt.; July 11, 1934. SURREY GROUP.—2nd Lt. G. D. McKenzie to be Lt.; July 11, 1934. 320th (C OF DUNDEE) AAS CO.—A. Pollock to be 2nd Lt.; July 11, 1934.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commander.—G. H. P. Padley to Home Aircraft Depot, Henlow, 9.7.34. For Engineer duties vice W/Cdr. E. L. Howard-Williams, M.C.

Squadron Leaders.—N. S. Douglas to Headquarters, Inland Area, 7.7.34. For Personal Staff duties vice S/Ldr. A. Durston, A.F.C. H. L. Rough, D.F.C., to R.A.F. Base, Leuchars, 10.7.34. For Administrative duties vice S/Ldr. C. Findlay, D.F.C.

Flight Lieutenants.—H. G. Rowe, D.F.C., to Experimental Section, Royal Aircraft Establishment, Farnborough, 9.7.34. F. Whittle, to Cambridge University Air Squadron, 9.7.34. (For course at University.) N. V. Wrigley, to R.A.F. Base, Calshot, 4.7.34. E. R. C. Hobson, D.F.C., to Headquarters, R.A.F., Middle East, Cairo, 6.7.34. L. C. Barling, to Air Armament School, Eastchurch, 9.7.34. G. A. Hadley, to D. of O., Dept. of Chief of the Air Staff, Air Ministry, 9.7.34. F. F. W. Hall, to Aeroplane and Armament Experimental Establishment, Martlesham Heath, 12.7.34. J. S. Dewar, to No. 801 (F.F.) Squadron, 10.7.34.

Flying Officers.—W. S. Hebden, to Station Headquarters, Kenley, 4.7.34. G. Nelson, to Cambridge University Air Squadron, 9.7.34. (For course at University.) I. B. Newbigging, to R.A.F. Base, Leuchars, 6.7.34. F. F. Wicks, D.F.C., to Station Headquarters, Biggin Hill, 8.7.34. D. L. Dustin, to No. 58 (B) Squadron, Worthy Down, 16.7.34.

Pilot Officers.—D. F. Balsdon, to No. 70 (B.T.) Squadron, Hinaidi, Iraq, 29.6.34. P. E. Meagher, to No. 84 (B) Squadron, Shaibah, Iraq, 22.6.34.

Acting Pilot Officers.—F. J. Manning, to Station Headquarters, Mount Batten, 9.7.34. A. E. Eady, to No. 2 Armoured Car Company, Ramleh, Palestine, 27.6.34.

Stores Branch

Flying Officer.—A. A. Quayle, to Station Headquarters, Northolt, 5.7.34.

Medical Branch

Squadron Leader.—J. K. R. Landells, to Station Headquarters, Netheravon, 6.7.34. For duty as Medical Officer.

A MIGHTY HUNTER: A Hawker "Nimrod" (R.R. "Kestrel" II's) on floats. The "Nimrod" is the standard fleet fighter of the R.A.F., and in its landplane form has a top speed of over 190 m.p.h.

CONTROL OF CIVIL FLYING

Report of Gorell Committee Published

THE report of the Committee on the Control of Private Flying, together with a memorandum by the Secretary of State for Air was issued last Friday.* The Committee consisted of Lord Gorell (chairman), Capt. H. Balfour, Mr. E. C. Gordon England, Mr. W. Lindsay Everard, Lt.-Col. J. T. C. Moore-Brabazon, Mr. F. Handley Page, and Mr. W. A. Workman, with Mr. W. W. Burkett as secretary.

The Committee's main recommendations are given below, together with the decisions of the Air Council. The report bears the signatures of everyone on the Committee, but reservations are attached in the names of Mr. Gordon England and Lt.-Col. Moore-Brabazon who wish to divorce the whole of civil aviation from the Air Ministry immediately; and in the name of Mr. Handley Page, who wishes control to remain with the Air Ministry.

Recommendations and Decisions

(i). There would be political advantages in transferring the administration of civil aviation from the Air Ministry to a purely civil Department of State, but technical considerations preclude this at present. The position should be reviewed before the end of the next decade.

(ii). In the meantime the Civil Aviation Directorate should be made as self-contained as possible within the Air Ministry, and the status of the Director of Civil Aviation should be improved. (These are dealt with separately in connection with the minority reservations.)

(iii). A certificate of airworthiness should continue to be required for aircraft engaged in regular air transport, air-taxi, joy-riding, and training work.

The Air Council accept recommendation (iii).

(iv). The control of airworthiness of civil aircraft should be devolved from the Air Ministry to the Joint Aviation Advisory Committee of Lloyd's Register and the British Corporation Register, reconstituted as a statutory, autonomous, and executive authority and renamed "The Air Registration Board."

The Air Council accept this recommendation in principle, subject to submission by the interests concerned of a scheme which is considered to be financially and technically practicable; the degree of statutory recognition to be accorded to the new Board and its future designation will require further consideration. The Board of Trade have, however, found it necessary to retain strict control over the design, construction, and subsequent maintenance of passenger steamers carrying over twelve passengers; and the Road Traffic Act of 1930 requires similar control to be exercised by the Ministry of Transport over public service vehicles carrying more than seven passengers. In these circumstances, having regard to the fact that the technique of aircraft design is still fluid and that the new Board will necessarily be experimental in character during the first years of its existence, the Government consider that the Air Ministry must retain for the present control over the airworthiness of the larger passenger aircraft used on regular air transport services.

(v). The Air Ministry should not prescribe the detailed requirements to which aircraft should be built.

The Air Council accept this recommendation, subject to the exception in (iv) above in the case of the larger passenger aircraft used on regular air transport services.

(vi). Such matters as the system of approved firms, the approval of modifications, the inspection for renewal of certificates of airworthiness, daily inspection certificates, and the system of ground engineers should be relegated to the Air Registration Board for decision.

The Air Council accept this recommendation in principle.

(vii). An annual grant equal to the deficit incurred by the Air Registration Board should be made to it from Air Votes for three years and the financial arrangements should be reviewed at the end of that period.

The Air Council accept this recommendation in principle, and are prepared to provide for the payment from Air Votes of four-fifths of the ascertained deficit, within a maximum to be agreed, for a period not exceeding five years in the first instance.

(viii). The representatives of the United Kingdom on the International Commission for Air Navigation should continue to press for the prescribing of international airworthiness standards in broad terms only, and also for international recognition of freedom from the certificate of airworthiness for private flying when this concession has justified itself by results in this country.

The Air Council accept this recommendation.

(ix). Certificates of airworthiness issued by any first-class manufacturing State with experience of aircraft construction should be validated automatically, on a reciprocal basis, by this country.

The Air Council accept this recommendation in principle, subject to further examination with the interests concerned of its practicability in present circumstances, having regard to the very complex issues involved.

(x). The possession of a certificate of airworthiness for aircraft used for private flying or aerial work should be at the option of the owner or hirer, but a third-party insurance policy (or an equivalent indemnity) should be effected and maintained.

The Air Council accept this recommendation; they consider that a certificate of airworthiness should still be required for aircraft used for club flying, and understand that this was the Committee's intention.

(xi). An inventor should be free to try out an experimental aircraft, provided that it is not flown to the common danger. It should not fly over any populous area or concourse of people or aerodrome where at the time of flight conditions make it dangerous to other parties. It should be allowed to fly over open country provided it bears identification marks, but in all cases it should be insured against third-party risks.

The Air Council accept this recommendation.

(xii). The holder of a (private pilot's) "A" licence should be free, as now, to carry non-fare-paying passengers without official endorsement of his licence authorising him to do so.

The Air Council accept this recommendation.

(xiii). The system of documents for aircraft should be revised; when flying in this country private and aerial work aircraft should have to carry only the certificate of third-party insurance, and public transport aircraft only this certificate, the certificate of airworthiness, and the licences of the crew.

The Air Council accept this recommendation.

(xiv). Accidents to private aircraft should be reported and investigated officially only if they involve death or serious injury.

The Air Council accept this recommendation.

(xv). The introduction of a scheme of compulsory third-party insurance for limited sums, or adequate alternative indemnity, against the damage caused by civil aircraft to persons or property on the ground, would be in the general interests of the community. Every aircraft should be insured against this liability for an amount calculated, in the case of heavier-than-air aircraft, on the basis of its authorised maximum total weight at the rate of £100 for each 100 lb., subject to lower and upper limits of £5,000 and £25,000 respectively. In the case of airships graduation of the amount within those limits should be reckoned according to cubic capacity on a scale to be settled by Air Ministry experts. The lower limit should apply to balloons, fixed or free.

The scheme should be assimilated as closely as possible to that for motor-vehicles under the Road Traffic Act, 1930. So far as alternatives to insurance are concerned, deposits with the Supreme Court should be not less than £25,000. It must be ensured as far as possible that the policy holds good in all circumstances when once it has been issued.

The Air Council accept this recommendation, subject to further consideration of the proposed limits of liability and other details.

(xvi). Towed gliders and gliders carrying passengers for hire or reward should possess certificates of airworthiness, and their pilots should hold appropriate certificates of competency and licences.

(xvii). Gliders should be included in the scheme of compulsory third-party insurance.

The Air Council will give these recommendations their careful consideration, in consultation with the British Gliding Association and other interests affected. They consider it essential that no action should be taken which will unduly hamper the development of gliding.

* H.M. Stationery Office. Cmd. 4654. Price 1/3.

They have further decided to give financial assistance to the gliding movement up to a maximum of £5,000 per annum for a period of five years.

(xviii.) It would be inappropriate to attempt to impose restrictions on Sunday flying in exercise of powers under the Air Navigation Act, and such action as is desirable should be taken under the Sunday Observance ordinances.

The Air Council accept this recommendation in principle.

Memorandum by The Secretary of State for Air

Following is an abridged version of the Memorandum on the Report by Lord Londonderry:—

In recent years the Air Council have relaxed control over civil aviation in various directions, *e.g.*, by the system of approved firms, whereby a firm's report that an aircraft complies with the published airworthiness requirements is, subject to general supervision by the Air Ministry, accepted in lieu of an official investigation; by entrusting to the Joint Aviation Advisory Committee increasing work in connection with the renewal of certificates of airworthiness; and by the institution of the Civil Airworthiness Committee which is responsible for advising the Secretary of State in regard to airworthiness requirements for civil aircraft. In 1933 the Air Council decided that the time had come for a further review of the regulations governing civil aviation, especially those affecting private aircraft, in order to ascertain whether additional relaxation of official control was practicable.

A committee of Departmental officials was appointed, and made a study of the question. It advocated substantial measures of decontrol. It recommended that, subject to certain reservations (in connection with aircraft operating regular passenger services), *all* work in connection with certificates of airworthiness should be devolved to the Joint Aviation Advisory Committee, provided that body was effectively reconstituted. It further recommended that, subject to certain conditions, including the institution of a system of compulsory third-party insurance, consideration should be given to making certificates of airworthiness optional for private aircraft.

In view, however, of the important and complex issues involved, the Air Council decided that it would be in the public interest to have the field reviewed by an independent and non-official committee, to whom they could also remit other questions affecting the future of civil aviation. Lord Gorell's Committee, in general, endorsed the findings of the official committee, whose report was specifically referred to them, and in certain respects have proposed that they should be carried farther. The Government have decided to implement the large majority of their recommendations, certain of which will in due course entail legislation.

Air Ministry Control

Another section of the memorandum deals with the reservations attached to the report by three members of the Committee:—

Recommendations (i) and (ii) and the two minority reservations deal with questions which were not remitted to the Committee. In consequence, no authoritative or considered official evidence was taken on their subject-matter, and it is clear that, as a result, the two signatories of Reservation I are seriously misinformed as to the principles underlying the present organisation and the manner in which it functions to-day. A detailed analysis of all the misconceptions which colour the reservation in question (to which the remarks which follow are addressed rather than to the main report) is perhaps unnecessary. For a majority of the Committee realise that the divorce of civil aviation from the Air Ministry is in any event impracticable for a long time to come without extensive duplication and consequent expense, as well as actual detriment to civil air development in the field of research, while Reservation II (signed by the member of the Committee who represented the Society of British Aircraft Constructors and has the most extensive practical experience of the problems involved) expresses the opinion that ultimate responsibility for the control of civil aviation should remain with the Air Ministry. As, however, Reservation I contains a number of misstatements of fact, which are none the less serious because they are unintentional, it appears necessary, in order to prevent further misunderstanding, to comment briefly on the more important of them.

The Air Council must emphasise in the first place that the implication that civil aviation is solely or primarily "viewed by the Air Ministry as a reserve of pilots for war and a potential set of machines to draw on in time of stress" is erroneous—as is indeed clear from the whole trend of the Ministry's policy in this matter. Civil aviation has, of course, an important if auxiliary rôle in the air defence of the Empire, just as the mercantile marine has in its naval defence. But British air transport policy (unlike that of almost every other nation) has, in fact, been directed throughout first and foremost to commercial development for pacific Imperial purposes. It has in consequence aimed at the maintenance of a civil air fleet and of personnel to man that fleet on a scale dictated by commercial needs alone; and there has at no time been any attempt to build up, in the guise of civil air transport, a fleet of uneconomic dimensions intended for military use in war. Similarly, the types of aircraft employed have been developed solely in the light of commercial requirements, and in no case has their design been influenced in any way by considerations of potential military uses.

Thus there is in the present air transport subsidy scheme no element parallel, *e.g.*, to that in the subsidy scheme formerly in force between the Admiralty and the Cunard Company, which provided for the incorporation in certain of their liners of constructional features designed to fit them for use as armed cruisers in time of war; nor do Air Votes contain anything corresponding to the small provision in current Navy Votes for work of a constructional character on merchant vessels which in case of emergency may be required for naval service. Again, the Air Council have throughout refrained from taking any action which might have the effect of "militarising" the subsidised light aeroplane clubs.

Military Influence

There is, further, no warrant for the suggestion that the fact that "the design of civil transport and private machines has shown more divergence from the military in this country than anywhere else" is due to "those in the Air Ministry concerned with civil aviation," if (as appears to be the case) the implication is thereby intended that this has been achieved in the teeth of opposition by other departments of the Air Ministry. It has, on the contrary, been due to the considered policy of the Air Council, implemented by all departments of the Ministry. Indeed, some of the most important civil developments in this country (*e.g.*, the light aeroplane and the light aeroplane club movement) were officially sponsored in the first instance, not by the civil aviation but by the technical department, though thereafter developed by both departments in close collaboration.

The statement that the increase in privately owned aircraft in this country (mainly light aeroplanes) has been only 17 during the last three years is mistaken. The actual increase in the three calendar years 1931 to 1933 was (as shown in Appendix B to the report) 75, or over 22 per cent. It is satisfactory to record that since January of this year there has been a further increase of approximately 90, making a total increase of 50 per cent. during the 3½-year period from January, 1931, to date, despite the difficult economic conditions which have prevailed.

The argument that the character of the technical regulations which have to date governed civil aviation is due to the fact that civil aviation is under the control of a so-called "purely military" department, and that the course of events would have been different had it been under a civil department, will not bear examination. Thus in the United States of America civil aviation has throughout been administered by a purely civil department; yet it is governed to-day by regulations fully as detailed as the corresponding British requirements. In general all leading countries which make civil aircraft have regulations similar in character and scope to our own governing their approval for certificates of airworthiness, whatever the nature of the authority responsible for the issue of such certificates

Moreover, it appears to have been overlooked that in this country the Civil Airworthiness Committee (which comprises both official representatives and representatives of the various outside interests concerned, and is responsible for advising the Secretary of State in regard to technical airworthiness requirements for civil aircraft) is presided over by the Director of Civil Aviation. As regards the status of this latter official, the recommendations made in the report under this head appear to be based on a misunderstanding of the position. The presentation of civil aviation business to Council would not be advantaged by the changes suggested. On the contrary, the special importance attaching to civil aviation has been clearly recognised by the fact that, alone of the Directorates of the Air Ministry, it is by Order in Council given the benefit of

direct ministerial, rather than official, representation. Any change in this respect would accordingly be liable to have the reverse of the effect intended; and the Air Council are not, therefore, prepared to entertain it.

Finally, it may be observed that the tenor of Reservation I as a whole appears to be mainly due to failure to appreciate the fundamental fact that the Air Ministry is not a "purely military" department at all. Parliament has charged the Ministry with two major civil functions (civil aviation and meteorology) independently of, and in addition to, its military responsibilities; and the Government have no intention of changing a basis of air organisation which has been so successful that it has since been adopted by foreign nations such as France and Italy.

THE ENGLAND–AUSTRALIA RACE

Preparations at Allahabad, and a Survey of the Route

PREPARATIONS for the England-Australia race are in full swing at Allahabad. Every machine taking part in the race has, of necessity, to stop at this city, which is the Indian Control Point. Within thirty hours of the start one or more machines will be expected, and the other entries should arrive in quick succession. Within about thirty hours of the arrival of the first machine all the aircraft will have left the aerodrome.

Since every competing machine will require between 300 and 400 gallons of petrol in as short a time as possible, Mr. M. G. Pradhan, officer in charge of the aerodrome, is arranging to provide special pumps, and refuelling will be done from tanks kept in readiness on motor lorries. Floodlights will be provided. Mr. Pradhan is arranging with some local electrical firms to install an engine to provide electric lighting, etc., for the numerous camps which will be erected in connection with the race.

It appears that the Government will be responsible for the landing arrangements only, and the official control timing will be done by the Indian Aero Club, which is an affiliated body of the Royal Aero Club. The Indian Aero Club will also provide for the comfort of the visitors. It is confidently expected that the landing ground which measures 900 yd. by 900 yd. will give no trouble to competitors.

Although the race will take place four months hence the officer in charge of the aerodrome has received inquiries from several persons who intend to fly to Allahabad to watch the machines. No decision has been made so far whether or not outside machines will be allowed on the aerodrome for the two days when the competing machines will be expected. It is likely that the Indian Director of Civil Aviation will prohibit visiting machines, other than the racers, from landing during that period.

The landing ground is expected to be in the best possible condition by the third week in October, as usually no rain is expected at that time. Last year, however, between October 21 and 26, 5 in. of rain fell at Allahabad. This does not give cause for alarm, for even if there is some rain no harm should be done to the landing ground. A public enclosure will be put up at the aerodrome for the use of spectators at a small fee, the takings going towards the cost of entertaining the competitors. It is unlikely that the wireless direction finding station which is near the aerodrome will be requisitioned, as it is thought that not many, if any, of the competing machines will carry wireless equipment when every bit of available space will be used for carrying fuel.

The Irish Entry

Eric Watt Bonar, the co-pilot of the Bellanca, which will be piloted by Col. J. C. Fitzmaurice in the London-Melbourne race, has arrived back in London after making a preliminary survey of the route between London and Singapore. Mr. Watt Bonar flew by Imperial Airways, and has brought back with him what is probably one of the most complete surveys ever made of this route.

Mr. Bonar's impressions of the first hop from London to Baghdad is that it is well equipped with landmarks in the shape of roads and rivers. At the time of the race the prevailing winds will be in the competitors' favour. One of the greatest dangers is a dust-storm region outside Baghdad. Baghdad aerodrome itself is eleven miles square and 120 ft. above sea level. It is completely equipped in every way, with boundaries marked with orange lights and all obstructions clearly lit. It has wireless telephony and directional finding apparatus which should prove of immense value. The night landing equipment is by floodlighting, and it has a red neon beacon which can be seen from a considerable distance.

The hop from Baghdad to Allahabad crosses the plains of India, and is where competitors are likely to experience bad weather. After Allahabad the terrain is one of the worst of the journey—the Dawna range of mountains necessitates a climb of 10,000 ft.—windy conditions are difficult and there are thunderstorms and electrical disturbances which render radio equipment ineffective. Here, also, are encountered the heaviest rains which force pilots to fly "blind" for sometimes as much as half-an-hour.

The distance from Allahabad to Singapore is 2,220 miles. The October monsoon is likely to cause considerable trouble, as it is actually a distribution of high winds rather than rain and cloud. Singapore is reached over a series of swampy creeks surrounded in mist

Col. J. C. Fitzmaurice and Mr. Bonar, the Hospitals' Trust pilots, are busily engaged in charting Mr. Bonar's observations. On the 28th of this month they will leave England for America to take delivery of the Bellanca machine, to be named *Irish Swoop*, which is now nearing completion.

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Airspeed (1934) Ltd.

As may be seen from our "New Companies" announcements, negotiations between the Tyneside Shipbuilding Company, Swan, Hunter and Wigham Richardson, Ltd., of Wallsend-on-Tyne, and Airspeed, Ltd., of Portsmouth, previously foreshadowed in *Flight*, have been completed, and a new company formed. Airspeed, Ltd., are well known to our readers, and do not, therefore, call for any introduction here, but it may be of interest to mention that Swan, Hunter and Wigham Richardson, Ltd., are one of the world's most famous shipbuilding companies, and were responsible for the construction of the *Mauretania* and other transatlantic liners. We understand that the new company will hold an interest in London, Scottish and Provincial Airways.

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PUBLICATIONS RECEIVED

Canadian Military Institute Selected Papers. No. 23. The Military Publishing Co., 52, McCaul Street, Toronto.

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NEW COMPANIES

AIRSPEED (1934) LIMITED. Nominal capital, £220,000 in 640,000 6 per cent. preferred ordinary and 240,000 ordinary shares of 5s. each. Objects, to adopt an agreement with Airspeed, Ltd. (in voluntary liquidation), and Montague Vincent, to carry on, develop and turn to account the property and assets referred to therein, and to carry on the business of manufacturers of and dealers in aircraft of all kinds, manufacturers and builders of or dealers in aeroplanes, airships, gliders, motors, engines and apparatus; to inaugurate, protect and maintain air services in any part of the world, etc. The directors are: Rt. Hon. Lord Grimthorpe, Easthorpe Hall, Malton. Sir Alan J. Cobham, Grand Buildings, Trafalgar Square, W.C.2. Leonard Tetley, 32, Upper Brook Street, W.1. Nevil S. Norway, 2, Chessington, Craneswater Park, Southsea. Alfred H. Tiltman, "Gharbieh," 39, St. Johns Road, Cosham, Hants. Chas. S. Swan, Bromley Grange, Stockfield, Northumberland. Sir Philip Wigham Richardson, Aldenholme, Weybridge, Surrey. Geo. Wigham Richardson, 7, Lowndes Court, Lowndes Square, S.W.1. Secretary: M. Vincent. Solicitors: Cameron, Kemm & Co., Gresham House, Old Broad Street, E.C.2.

AIRMEDIA, LTD., Chandos House, Palmer Street, S.W.1. Capital, £1,000 in 5s. shares. To acquire the business of advertisement contractors or agents carried on by Bernard H. Cruikshank and Albert E. Hibbert, at 68, Norbury Hill, Norbury, S.W.16, as "Airmedia," and to carry on the said business and that of proprietors of aeroplanes, aerodromes and aerodrome property, etc. The permanent directors are: Bernard H. Cruikshank, 68, Norbury Hill, S.W.16. Albert E. Hibbert, 42, Carolina Road, Thornton Heath, Surrey. Solicitors: Gasquet Metcalfe & Walton, 92, Gt. Tower Street, E.C.3.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors.
(The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

APPLIED FOR IN 1932

Published July 26, 1934

36815. COMPER AIRCRAFT CO. LTD., and N. COMPER. Undercarriages of aircraft. (412,593).

APPLIED FOR IN 1933

Published July 26, 1934

12289. BENDIX AVIATION CORPORATION. Clutch-control mechanism. (412,737).
12141. L. R. TOWER and BOEING AIRPLANE CO. Means for controlling aircraft. (412,740).
15378. Y. L. MESSIER. Suspension apparatus for aeroplane landing gear. (412,759).